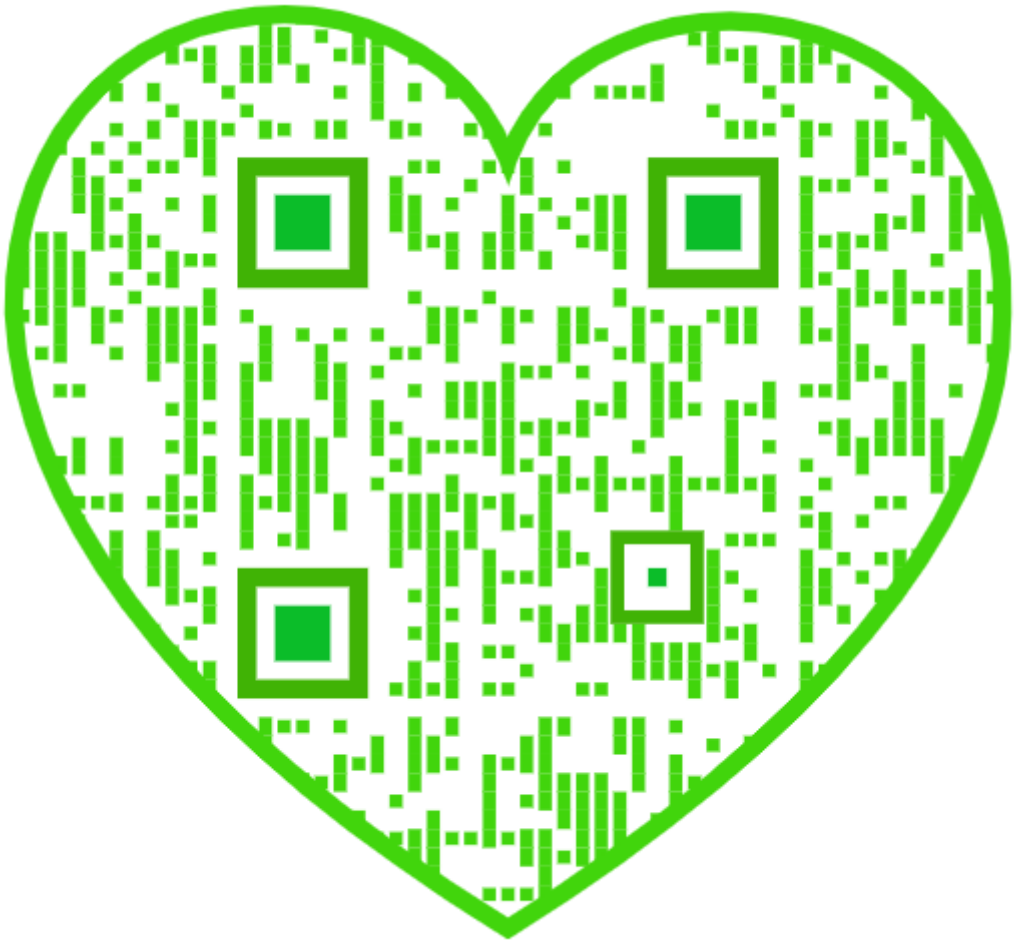
THE DISEASES OF SHEEP

WITH AN ESSAY ON CATTLE EPIDEMICS

BY

HENRY CLOK, V.S.



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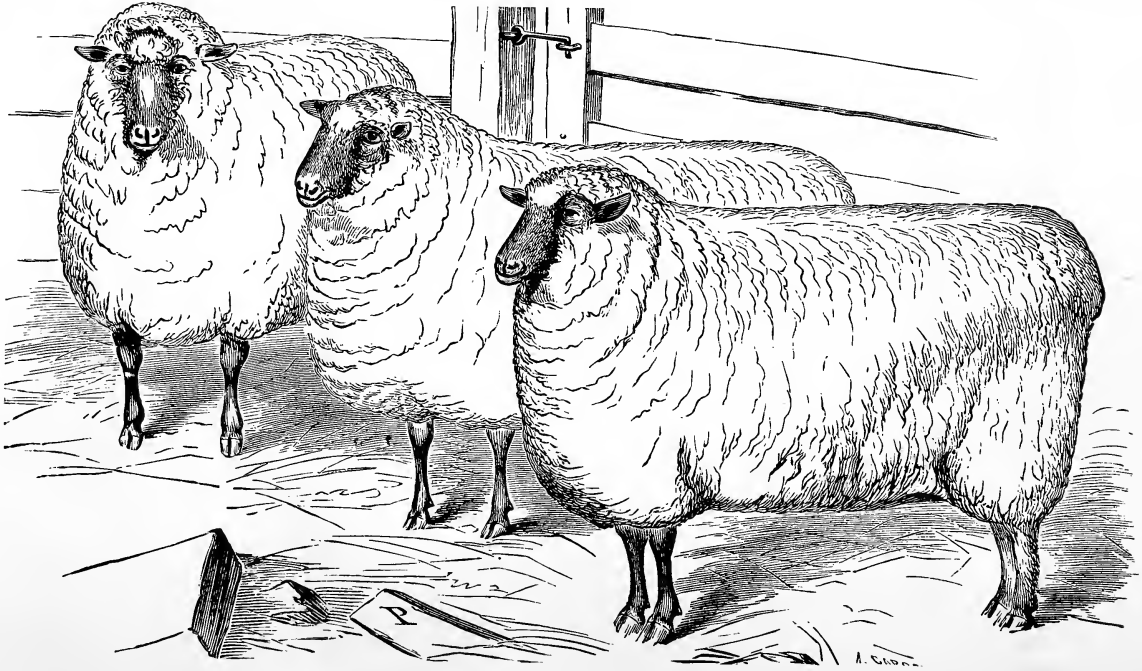

GROUP OF OXFORD DOWN EWES.

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THE

DISEASES OF SHEEP

EXPLAINED AND DESCRIBED,

WITH

THE PROPER REMEDIES TO PREVENT AND CURE THE SAME.

WITH AN ESSAY ON CATTLE EPIDEMICS.

ESPECIALLY DEDICATED TO THE USE OF FARMERS, SHEEP-OWNERS, ETC.

BY HENRY CLOK, V.S.,

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10

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CONTENTS.

DISEASES OF SHEEP.

	PAGE
PREFACE	7
NATURAL HISTORY OF THE SHEEP	11
INFLAMMATION IN GENERAL	15
Diffusion—Suppuration—Ulceration—Exudation—Callosity—Gangrene—Cure of Inflammation—Remedies.	
ANTHONY'S FIRE	27
SHEEP POX	35
Period of Contagion—Period of Eruption—Period of Maturity—Period of Healing—Vaccination of Sheep Pox—Mechanical System of Vaccination—Vaccination of the Ear—Process of the Vaccinated Pox.	
VERTIGO OR STAGGERS IN SHEEP	64
ITCH OR SCAB IN SHEEP	69
INFLAMMATION OF THE LUNGS	77
MALIGNANT FOOT ROT	78
Malignant Foot Rot—The Mild Form.	
THE FLUKE	90
GNAW DISEASE (Hydrocephalus hydatidesis)	91

PAGE

Inflammation of the Brain..... 94

Diarrhœa and Dysentery..... 95

Cough..... 97

Lung Worms..... 97

Erysipelas..... 100

Inflammation of the Throat..... 102

Sore Mouth..... 102

Epilepsy..... 103

Staggers..... 103

Hæmaturia..... 104

Inflammation of the Kidneys..... 105

The Rot..... 106

Wind Dropsy..... 108

Palsy of Lambs..... 110

Maggots..... 115

The Larvæ of the Gadfly..... 116

Madness..... 118

To Tell the Age of Sheep..... 120

Cancer of the Tongue..... 122

Internal Diseases..... 124

With Regard to the Surface of the Body—With Regard to
88 the Circulation of the Blood and the Respiration—With
88 Regard to the Digestion, Excretions and Secretions—
88 With Regard to the Senses—With Regard to the Organs
of Locomotion.

Classification of Diseases..... 127

DISEASES OF CATTLE.

PAGE

THE CATTLE POX 131

SPLEEN DISEASE 136

Spleen Disease in Cattle—Spleen Fever—Spleen Carbuncle—Remark.

PLEURO-PNEUMONIA, CATTLE EPIDEMIC OR RINDERPEST 141

Symptoms of the Acute "Lungenseuche"—Cattle Epidemic—Dissection.

PREFACE.

THE chief and only object of this work consists in a description of the internal and external Diseases of Sheep, as well as of their treatment and prevention. The author believes that he has omitted no disease of any considerable importance. The systematic arrangement of a book like the present necessitates diligent research and the experience of many years. In order not to make their works appear too incomplete, authors frequently resort to lengthy dissertations, which may not be entirely without benefit to the general reader, but which had better be dispensed with, because they render the study of the subject tedious and diminish the usefulness of the book. In the interest of the reader I have left unimproved this opportunity of acquiring an easy reputation for erudition by adorning this book with numerous quotations, being of the opinion that it matters very little to him when, by whom and under what circumstances certain useful results have been obtained, if he is only made acquainted with their existence. The reader is therefore requested to grant me his confidence if I do not, except in a few instances, produce authorities for my assertions. I believe myself justly entitled to his confidence, since I am thoroughly conversant with the foreign and home literature on the subject, and

have acquired an extensive experience by long-continued, assiduous study and the practice of many years.

Everything related by me in the present work is the result of my own experience and observation. Hardly a single disease is mentioned which I have not observed and treated. The descriptions of the diseases, and the directions for their prevention and cure, are therefore based substantially on my own observation. In the few instances where I have departed from this rule, I have availed myself of the experience of others, after subjecting it to a thorough criticism. As I have often been disappointed in life as well as in science, I have become very suspicious and skeptical; and this accounts for the fact that I have admitted nothing except after a careful investigation and examination. Nothing in this book is the mere product of philosophical reasoning or hypothetical theories, and it contains solely the results of my own observation and experience, and therefore facts. As, however, nothing is perfect, and man is liable to err, I may nevertheless have committed mistakes—it would be absurd to assert the contrary—and for these I ask the indulgence of the public.

It is unnecessary to dwell long on the object of this book. Let it be understood that it is not my aim to make veterinarians of my readers, for that would be not only a useless and foolish undertaking, but might also be attended with dangerous consequences. I wish, however, to furnish the reader the necessary information to enable him to form an opinion of his own, and to burst the shackles of prejudice, which exists especially in this country, where veterinary science is still in its infancy. A careful perusal of these pages will enable him to understand the extent and probable limits of the science—what it can and what it cannot accomplish; so that he may not be induced by quacks

to waste money, time and trouble upon hopeless cases, or to give up too hastily the cure of an animal that might still be saved.

The non-professional may not be able to treat many diseases or execute the operations described here; but in others which require instantaneous aid, such as wind-dropsy, he must help himself, and he can cure diseases like scab, foot-rot, etc., as well as the veterinary surgeon. It is also of considerable advantage to him to know the nature of the disease, its degree of danger, and whether delay is admissible. He can make the necessary arrangements, separate the sick from the healthy in contagious diseases, and continue properly the treatment commenced by the surgeon.

Another, and not the least important, object which I have in view is, that the reader may be induced to form a higher opinion of the veterinary science and of its disciples than has hitherto prevailed.

All connoisseurs agree that veterinary science, in theory as well as in practice, has made great progress in the last thirty years—greater perhaps than during all preceding times. I cannot too earnestly advise owners of cattle to avail themselves of the services of really educated practitioners, for they act against their own interests by following the advice of quacks and ignorant persons. The trifling fee of the surgeon should not be taken into consideration when, as is often the case, the safety of a whole flock or herd is at stake.

The publication of this book is therefore not at variance with the recommendation to employ educated veterinarians, for its object is a twofold one; and time will, it is hoped, demonstrate its success. The motto which I would like farmers and cattle-owners to adopt is, "Help yourself when possible, and employ a veterinarian in other cases."

Veterinarians will never be esteemed according to their merits as long as there is a want of general knowledge of the subject. The present work is intended to meet this want to a certain extent.

Respectfully,

THE AUTHOR.

PHILADELPHIA, 1868.

NATURAL HISTORY OF THE SHEEP.

THE sheep belongs to the order *Ruminantia*, or ruminating animals, and is of small stature, of a white, and more rarely of a brown or black color, has a small head, pointed ears, a curved, narrow nose, a pointed mouth and a cloven upper lip. Some races are provided with horns having knotty rings, but these horns are more frequently found in the male than in the female: in the latter they are either smaller or entirely wanting. The udder consists of two parts, and is furnished with two teats. The greater portion of the body is covered with long, curly hair or wool. Another peculiarity of the sheep is seen in two sacs or cavities—one under the eyes and the other above the cleft of the hoof—which secrete a greasy, viscid liquid. The sound produced by the voice of the sheep is called bleating.

The sheep is certainly one of the most ancient domestic animals, and it is not surprising therefore that as little is known about its origin and nativity as about those of the ox or cow. According to all probabilities, its wool is a product of breeding, since the wild species of sheep (especially the mufflow and argali, which many consider the first parents or primitive species of the sheep) have common hair, below which there is a woolly coating. The sheep appears to be originally a mountaineer, as would appear from the facts that all wild species live in the

mountains, and that it shows a preference for dry pastures in elevated situations, where it can find tender, dry and fragrant herbs. On the other hand, all wet and marshy meadows, which bring forth watery and acrid plants, are positively injurious to its health. It is true that the sheep will accustom itself to lowlands containing rich pasture, but it is more liable to diseases there, and not as long-lived. It is not at all sensitive to a moderate degree of dry cold, because it is protected against it by its fleece; but great heat and moisture are manifestly injurious to it. Temperate and cold climates appear to be more favorable to the growth of fine wool than hot climates. The races living in the latter have either no wool at all, but common short hair, like the fallow-deer, or have coarse wool; which is also the case with the sheep in the extreme north.

The sheep is naturally timid, and not very lively, but very peaceable, and can therefore be easily kept in large herds or flocks and led by a shepherd or a dog.

The age of the sheep is limited to twelve or fifteen years. Some races are longer and some shorter lived.

Sheep are distinguished by the following names with regard to their sex and age: male animals are called rams, and when castrated or gelded, wethers; female animals, ewes; young animals, up to the first year, lambs, and then yearlings (having two teeth), and between the first and second years hoggerels or hoggets. After the second year they have four, and after the third, six teeth. In their fifth year they are said to be full-toothed, and are then called old. Animals which are no longer fitted for reproduction are said to be "cast off."

The sheep is found on the greater part of the earth's surface, and comprises many races, which are mainly distinguished by their size and by the nature of their wool. As regards the

latter, they may be divided into two great classes—those with short and those with long wool. The short wool is undulated and curled, fine and soft; while the long wool is straighter and coarser. Sheep having short, fine wool are more slenderly built, but resist the changes of the weather better than the others, and even become quite fat on moist, low pasture-grounds. The merino sheep belongs to the first, and the common German sheep, the Bergamo sheep, etc., to the second class.

The finer breeds of sheep are chiefly raised for their wool; which is shorn *usually* once a year, but sometimes twice, and it is manufactured chiefly into cloth. The coarser sheep are kept as much for their meat, suet and milk (from which a fatty cheese is made) as for their wool. The excrement of the sheep is, as is well known, an excellent fertilizer; the hides are made into morocco or worked up with the wool into furs; the tallow is used for burning; the intestines are manufactured into strings for musical instruments; and the horns, hoofs, bones, etc., put to the same uses as those of the horse, ox and other animals.

DISEASES OF SHEEP.

INFLAMMATION IN GENERAL.

In the majority of diseases to which sheep are liable, inflammation of different parts of the body, either internal or external, is the prominent symptom, and is the foundation of most, often constituting the disease itself, and sometimes being the beginning or the ending of other diseases. The number of such diseases during the progress of which an inflammation of a larger or smaller extent does not appear to take place is not very large. Their frequent occurrence, and also the dangerous and often deadly consequences of such inflammations, require the greatest possible knowledge of the most important events by which inflammations are indicated, and for this reason the same shall be here amply and fully described.

Wherever upon any part or spot of the body an increased redness, an increased warmth, a swelling or extraordinary sensibility appears, inflammation is indicated; that is to say, such part or spot is inflamed. The functions of such an inflamed part are generally more or less disturbed and unhealthy, and consequently such disturbed functions are to be taken as a reliable and most characteristic mark of inflammation. All parts of the body (the epidermis or upper skin, the wool, the hoof, and the eyes excepted) are

subject to inflammation, although such inflammation appears in the different parts of the body in as many different symptoms. Some of these parts are more vehemently and oftener inflamed, and others less; and the occurrence of such different symptoms may be explained by the following examples:

I. *Increased redness* occurs always wherever a healthy part becomes afflicted with disease, this being the consequence of an increased accumulation of the blood in such parts, which in a healthy state contain no blood at all, but are now extended and filled with globules of the blood; and the larger veins receive larger quantities of blood and begin to swell. There are a great many different degrees in the increase of redness, the color of such inflamed redness changing from pale pink to cherry-red and even blackish-red. In those parts where the construction is of a spongy or loose nature, and which in their healthy state already contain a great many blood-vessels, and consequently always appear of a more or less reddish color (as, for instance, the mucous membranes of the nose, the external membranes, the lungs, etc.), a more conspicuous and intensive redness is produced by inflammation than in other parts of a stronger and solid constitution, which do not contain as many blood-vessels (as, for instance, the bones, the cartilages and the transparent part of the eyes). The redness is not always of the same intensity during the progress of inflammation. In the beginning the redness increases with the development of the disease, and also disappears with the decrease of the latter, with more or less rapidity. When inflammation occurs in sheep, the increase of redness is not always perceptible. The compactness of the wool, especially that of black sheep, the darkness of the color of the skin, prevent the inexperienced eye from observing such increase. The same may be said in regard to the intestines and all other

parts covered by the skin. Nevertheless an increase of redness always takes place whenever an inflammation occurs, which may be observed at the dissecting of the carcass, or whenever an internal part is exposed either by accident or design. The redness of the inflamed womb or intestines is generally not perceptible on account of the situation of those parts, but may become visible whenever, from the injury of the abdomen or at difficult birth, the intestines or the womb are turned outward and become inflamed in the body. There are, however, some parts upon which in their inflamed state an increased redness is always perceptible without difficulty (as, for instance, upon the mucous membranes, the nose and the vagina), as also upon the connecting membranes of the eyes, the udder, and where the body is affected with pox.

II. *Increased warmth.* An inflamed part contains a greater degree of warmth than in its healthy state, and such an increase is easily perceptible upon nearly all exposed spots, or such spots as can be reached by the hand. In internal inflammation, however, it is always very difficult, if not impossible, to detect such an increased degree of warmth. We have therefore to depend upon such indications as are either popularly known or are of a singular nature, or upon the increased temperature of the skin, the nose, the interior of the mouth, the breath, the eye, etc. The cause of the increase of warmth in inflamed parts is the increased accumulation and circulation of the blood, and the increased activity of the affected parts.

III. *Swelling.* The inflamed part almost always appears to be more or less enlarged or swollen, and becomes strained and hardened in a measure, according to the constitution of such inflamed parts. This swelling is caused by the increased pressure of the blood, effusion of the blood, lymphatic or fibrous matter, and as a consequence of the

increased warmth by which the textures become extended. There is always a difference in the degree of the swelling, which varies according to the intensity of the inflammation, or according to the place or structure of the affected parts.

IV. *Pains.* Every inflamed part possesses a greater irritability than in its healthy state, although not always in the same degree. The intensity and duration of the inflammation, the place and constitution of the inflamed part, and particularly the presence of a larger or smaller number of nerves, are the causes of as many differences in the degree of such irritability. Besides this, it must be taken into consideration whether the affected part in its healthy state is more or less irritable and sensitive. For instance, inflammation of the eye is generally very painful, inasmuch as the organ in its healthy condition is very delicate and sensitive; inflammation of the stomach is extremely painful, because the stomach contains numerous and very large nerves; whereas inflammation of the lungs and heart does not cause such intense pain, because both these parts contain very few nerves. The inflammation of loosely-constructed or spongy parts, which easily enlarge, is generally less painful than that of those parts which are more compact and not so liable to extend. Often we perceive the pain only after pressing the inflamed part, as, for instance, in inflammation of the *throat.* When inflammation of the *brains* occurs, the eye becomes red and fixed or staring, and inflammation of the *eye* causes pain to the eyes even in daylight. Whenever the *lungs,* to which air is most important, are afflicted with inflammation, the introduction of cool air causes a cough, which in a healthy condition would not occur: the lungs are therefore most liable to irritation and pain.

V. *Disturbed Functions.* Whenever any part of the body is inflamed, the natural functions of that part are more or less changed, disturbed, or destroyed. The know-

ledge of this fact is of the greatest importance, inasmuch as by its means we are enabled to detect a great many inflammations, especially those of the internal parts of the body. It very often happens that such disturbances are the only and most reliable indications or signs of the prevalence of inflammation. Without such a disturbance, the detection of many kinds of inflammation would be very difficult or impossible during the life of the animal; for example, inflammation of the lungs is not perceptible to the eye, because we are unable to see the principal marks of inflammation, such as redness, swelling, etc., but we are able to perceive a difficult, increased and short respiration, frequent and painful coughing, hot breath, etc.; these are conspicuous deviations and disturbances of the natural functions of the lungs, and furnish the most important indications of the prevailing inflammation of the same. These disturbances alone are, however, said to be not sufficient to prove the truth of the assertion that an inflammation of the lungs exists, because other indications, such as redness, swelling, etc., are not sufficiently demonstrated. Such doubts are nevertheless entirely removed by experience. We find, for instance, whenever a carcass is dissected and inflammation of the lungs proved, that the beforementioned disturbances of the functions of the lungs have always occurred during the life of the animal. We must therefore presume that such an inflammation exists whenever difficulties in the respiration, together with other indications, occur. In some of the inflamed parts the disturbances of the natural functions are more conspicuous than in others, according to the place, the extent and the degree of such inflammation, and also according to the nature and importance of the natural functions of such affected parts. Inflammation of the *brain* produces the most vehement symptoms, the brain being the most delicate part, perform-

ing the most important functions. Inflammation of the brain also produces a great disturbance, whereas an inflammation of the spleen, of different parts of the glands, and of different external and inferior parts, is of no such important consequence. Inflammation is very often followed or accompanied with more or less vehement fever, which in such cases is called inflammatory fever; it is, however, not always the case that such inflammation is attended with fever, and the latter cannot therefore be reckoned among the necessary and reliable indications of the former. A great many external, and some of the internal, inflammations are not accompanied with fever, particularly when the inflamed part is of a small extent, not painful, or when such inflammation is not very vehement. If, however, such an inflammation is of a vehement character, very extensive and painful, or affects any important or delicate part, etc., the fever generally occurs and becomes perceptible by means of the increase of pulsation and other incidents; for instance, there is no fever whenever inflammation occurs in consequence of a slight external injury to the skin, and fever always appears whenever the lungs or intestines are inflamed. The duration of inflammation varies materially, and depends upon the place, the extent, the degree of intensity of the same—also upon the constitution of the afflicted animal, the cause of the disease and upon numerous other known or unknown circumstances. Inflammation is in most cases of a short duration, occupying a period varying from a few days to two or three weeks. In case a considerably longer duration occurs, such inflammation is called "slow or lingering fever," in which several of the inflammatory indications disappear, such inflammation then changing into another state or issue of the same. Every inflammation increases more or less rapidly to a certain degree, and terminates in another issue. The most

prominent kinds of such issues are,—Diffusion, Suppuration, Ulceration, Exudation, Callosity or Hardening, and Gangrene or Mortification, which are described as follows:

1st. *Diffusion.* This issue of an inflammation is the most desirable and beneficial, and in almost every case the consequence of prompt and suitable remedies.

2d. *Suppuration.* Whenever a diffusion of the inflammation does not occur, and the latter continues with more or less vehemence, suppuration will probably and generally take place. Suppuration consists in the formation of a fluid, which in the beginning is of a thin and watery appearance, but afterward changes into a fluid of a slimy and stronger consistence, without any remarkable smell, and in appearance like cream. The secretion of the inflamed part occurs either upon the surface or at the bottom of the same, and produces, whenever a larger amount of secretion takes place, the so-called boils or an abscess. All parts of the body are not in the same measure inclined to suppuration, although there is scarcely any part which under certain circumstances cannot be affected with suppuration. The liver, spleen and muscles are very seldom affected with suppuration, whereas the upper skin, the cellular tissues, etc., very easily begin to suppurate. Suppuration is either produced by transformation of the fluids (such as blood, fibrous matter, etc.), which enter into the inflamed parts or is otherwise a secretion of the so-called carbuncles.

3d. *Ulceration.* This represents another kind of suppuration, the former being of a mild nature, whereas ulceration is of a malignant character; for this reason the latter is sometimes called "malignant suppuration." This is always the consequence of an inflammation. It consists in a sore, from which a certain fluid matter of a fetid smell emanates. Instead of healing, the sore changes into ulceration by constantly enlarging upon and destroying the

affected parts; a certain spongy texture of a disagreeable, scarlet or bluish color, and called "proud flesh," is formed, which extends and grows over the opening of the sore.

4th. *Exudation.* Properly, inflammation always produces a certain degree of exudation, but now we have to refer to such exudations only as occur after an inflammation has subsided. Exudation consists of blood, water and fibrous matter. Bloody exudations are of rare occurrence, and are in most cases the consequence of a rupture of blood-vessels, occasioned either by external force or by an excessive swelling and overloading of such blood-vessels. Exudations and effusions of water, or of fluids which are very similar to lymph, very often occur, either in the interior or upon the surface of the membranes which cover the abdominal cavities, or in the cellular tissues. In many cases of inflammation of the chest, a large amount of water is exudated through the inflamed diaphragm. In others, and especially in nearly all violent inflammations, exudations of fibrous matter, often of very large amounts, take place. This often affects adjoining parts; for instance, the lungs may adhere to and grow together with the chest. In most cases exudations of water and of fibrous matter occur at the same time.

5th. *Callosity.* Whenever a part remains in a hardened, enlarged and stiffened state after an inflammation of the same has subsided, we call the issue of such inflammation "callosity." Such a callosity is nearly always the consequence of exudation of fibrous matter, remaining as a deposit in the previously inflamed parts. Such callosities are often connected with dangerous consequences, although in a great many cases only trifling or scarcely any consequences whatever are perceptible.

6th. *Gangrene.* This is the most fatal of all issues, producing the decay of the diseased parts, or, if such a decayed

part has been of an important nature, the death of the animal. Whenever exterior or less important parts (for instance, the skin to a great extent) are affected with gangrene, there is no danger, but gangrene of the entrails always results in death. The degree of importance of the affected part, therefore, always increases the danger to be feared from gangrene. Gangrene generally arises from extremely violent inflammations, which continue for a longer period; also from mechanical causes, such as continual pressure or forcible contusions, from frost or burns (in frost-bitten or scorched limbs), from the effect of animal, vegetable and mineral poisons; and wherever the circulation of the blood is entirely checked, either by accident or by design (for instance, when a wort or a scrotum is tied off, such parts always become affected with gangrene). Two kinds of gangrene exist—namely, the so-called hot gangrene (mortification), and cold gangrene (sphacelus), the former being the last degree of inflammation, and constituting the intermediate degree or transition from inflammation to the latter (sphacelus). Parts affected with mortification can never be reanimated. A gangrenous part ceases by degrees to be subject to pains, the swelling and the former hardness and tension caused by inflammation partly disappears, and the impression made by the touch of the finger upon such a part remains for a considerable time. A gangrened spot is a dark red, bluish-black, pallid or pale gray color. The skin of such a part separates in different places of the ulcer and rises in the form of bladders, from which a thin, acrid and bad-smelling fluid issues, or sometimes in the form of air-bubbles of larger or smaller dimensions. A gangrenous part contains no warmth at all; it is cold and painless, beginning to rot, and therefore entirely void of life. The detection of gangrene in interior or such parts as cannot be

seen or felt is generally very uncertain or difficult, and we therefore have to depend upon incidental indications, or upon the effects which according to experience demonstrate the presence of such an affliction. Whenever, for instance, an inflammation of the entrails results in gangrene, the previous vehement pains disappear entirely; the skin is covered with a cold perspiration; all visible mucous membranes become of a pallid color; the breathing is cold; pulsation ceases to be perceptible; the glance of the eye is weak and waning, and the animal dies. The examination of the carcass shows that all such incidents were the consequences of gangrene of the entrails, and like incidents demonstrate therefore in future cases the presence of such an affliction.

Procreative causes—that is to say, such causes as occasion a direct and instantaneous inflammatory irritation—are very numerous and manifold, either of a general nature, affecting the whole body; or of a local nature, affecting only certain special parts of the body. Among the causes of a general nature are particularly to be mentioned sudden cold, excessive heat or cold, damp and also very dry air, fatigue, sudden change from continual rest to vehement exercise, bad stable-air, continual effect of moisture and rain, sunstroke, etc. Local procreative causes are heavy strokes or blows, contusion, continual pressure, wounds, laceration, stones in the entrails or in the bladder, different kinds of poison, hot water, burns of every kinds, frost, different kinds of contagious matter, etc.

It is impossible to describe in general and with certainty the several degrees of danger incident to inflammation, because inflammation may occasion the slightest and also the most important and dangerous disease. In this connection we have to consider, the place, the extent, the degree and cause of the inflammation, the constitution of the animal, the effects of the remedies and numerous other circum-

stances. The degree of danger in inflammation depends upon the delicacy and importance of the affected part. Inflammation of the brain and of the entrails is connected with a considerably greater degree of danger than inflammations of the exterior skin: the more extensive an inflammation the greater the danger. Interior parts are seldom subject to suppuration. In exterior parts suppuration is nearly of the same beneficial effect as diffusion, and therefore in most cases without any dangerous result.

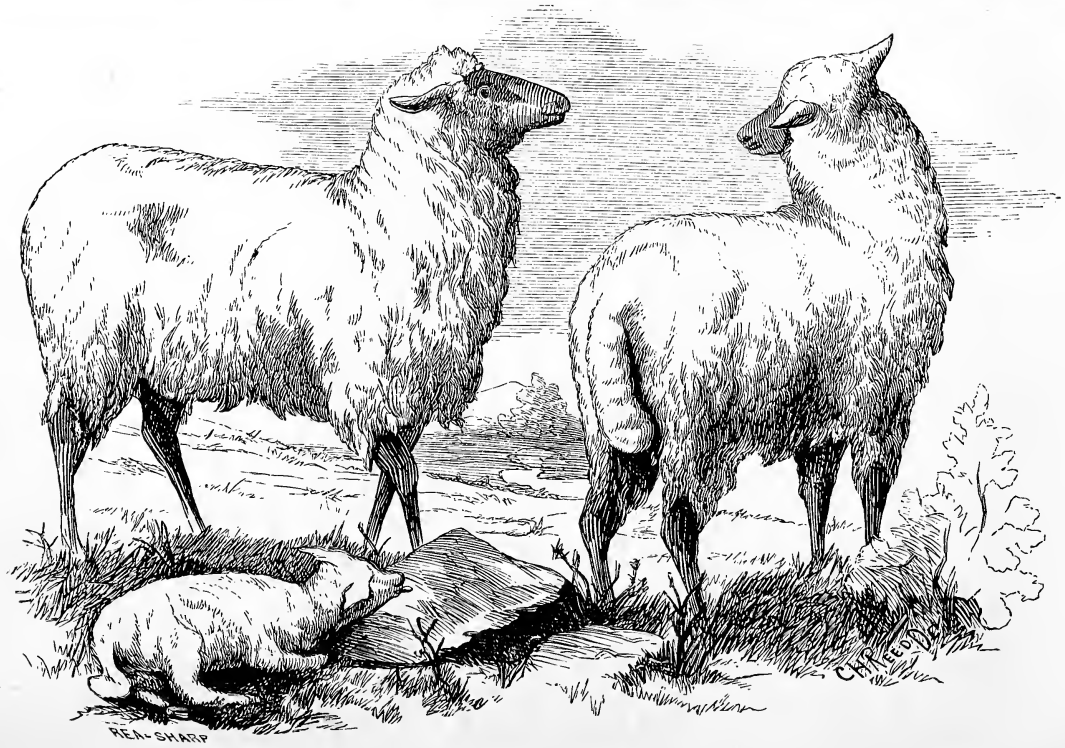
The issue into callosity or hardening is mostly of unimportant consequence, except when interior or largely extended parts are affected. Gangrene is always dangerous, and often of deadly consequences in case interior parts are affected by the same; if, however, exterior or unimportant and less extended parts are affected, there is generally no danger.

Cure of Inflammation.—The cure of inflammation depends upon its duration, intensity, place, extent, cause, and numerous other circumstances, demanding different deviations in the treatment, according to the variety of the case; but there are nevertheless several common rules by which we may be guided. In the first place, it is necessary to inquire into and examine the causes, and when discovered to remove them, or at least to render the same as harmless and innoxious as possible. Some causes are not discernable, or have been already removed in the beginning of the inflammation; as, for instance, when an inflammation has been caused by taking cold during vehement exertion of the animal. In a great many cases, however, the cause remains effective even after the beginning of the inflammation, and increases and maintains the disease. Extraneous matters which have been forced into the body must be removed; acidulous or corrosive substances have to be diluted and washed away with water or milk, or to be covered and

their effect destroyed by means of slimy matter or oil. Compression, friction and all irritation must be avoided and removed, and the suffering animal as well as the affected part must remain undisturbed as far as possible. When inflammation takes place, exercise is always dangerous, a very few cases excepted.

The treatment is either of a general character, operating upon the whole system or body of the animal, or of a local character, directing its effects mainly upon the affected part. Often both modes become necessary, although in a great many cases only the latter is required; as, for instance, in the inflammation of interior parts, such as the lungs, the brain and the entrails, and also in violent inflammation of the exterior parts. Inflammations, however, which are connected with fever require a general cure.

Remedies. Venesection or bleeding was formerly considered one of the most important remedies; at the present time, however, this remedy is not so frequently resorted to, on account of the employment of attenuating, cooling or aperient remedies, whose effects are preferable to those of venesection. The principal remedies employed in inflammations are saltpetre, tartar, epsom, bitter or glauber salts; sal-ammoniac, sulphuric acid, vinegar or yeast diluted with water, mixed with and served instead of the pure bran among the fodder or drink, or administered to the animal in form of a drink or injection. In case of constipation, injections are to be given repeatedly, the animal must be kept quiet in a warm place, and all drafts of air carefully prevented; the food consisting of straw, green fodder, leaf and knob plants, bran; hay is to be given in small quantities, and feeding with corn must be entirely avoided; the drink should consist of lukewarm water, mixed with sulphuric aid or saltpetre, in as large quantities as the animal may desire.



DOMESTIC SHEEP.

ANTHONY'S FIRE.

This disease, which is known under different names, is, wherever it occurs, of a most dangerous character, and seems to be known in nearly all parts of the world, and especially in Europe. It represents a special kind of mortification of the spleen (which will be more fully explained hereafter), and occurs in some particular seasons oftener than others, the climatic character of the country and other local circumstances causing as many different phases of the disease. In this connection it may be stated that the disease very often appears in the northern part of Germany, especially in Prussia. I have been also informed by a Hungarian nobleman, who is the owner of very extensive tracts of land situated upon the banks of the Danube and of the river Theiss, that the average loss from this disease, in said district, annually amounts to ten or twelve thousand sheep. It is further stated that in the county of Argyleshire, Scotland, the average loss per year amounts to seventeen thousand out of every seventy thousand sheep. This disease, although well known for a long time in our country, seems to increase with the importation of foreign or imported stock, which nearly always causes its more frequent occurrence and still more dangerous consequences. The disease generally arises very suddenly, without any previous perceptible indications, the animal enjoying a good appetite and hunger, the color of the skin being in its ordinary state, and all other indications showing undisturbed health. Suddenly the whole body begins to tremble, the animal ceasing to eat, putting the feet wide asunder; it staggers and reels, appears to be senseless, drops down, with teeth grating; the breathing is extremely short and difficult, the eyes become red and glaring, protruding from the sockets and insensible to the influence of light; the mucous

membranes of the mouth become of a blood-red color; the animal involuntarily loses its excrements and urine, which latter is often covered or mixed with blood; the animal at the same time kicking and throwing the legs about, turning head and neck backward, the breathing often causing a rattling noise, and a bloody scum issuing from the mouth. Such attacks are often of only five or ten minutes' duration, after which they result in death. This is especially the case with young sheep; old sheep sometimes resist several of these attacks, and then die after a few hours. If death does not occur after such attacks, the animal becomes very weak and inanimate, the ears and legs being cold. Such sudden attacks are often followed by a gentle and soft expiration of life; the animal is often restless during the night, and its body is then in the morning found to be lifeless. In case such disease is of longer duration, the animal is observed to remain apart from the herd, deeply drooping the head, the walk being inanimate and weak, the ears hanging downward, the neck swollen, the blood-vessels of the eye extended and filled with dark-colored blood; the mucous membranes of the mouth are of a blood-red color, the dung is hard and covered with bloody slime; and the perspiration produces an adhesive matter of a very bad smell. At last the animal begins to reel and tumble with convulsions; blood flows from the nose, mouth and anus. In case of venesection, the blood flows easily and is of a dark-red color. In such cases death generally ensues in from one to three days, seldom later. When an animal becomes afflicted with this disease, it often happens that upon several places of the skin (especially upon such places as are little covered with wool, as, for instance, the belly, the udder and the inner side of the shanks) there appear certain erysipelatous freckles, which in the beginning are of the form of small knots, and rapidly increase in size

and number. The affected skin is in the beginning of a red color, which changes very soon into a purple or bluish-red; the skin swells, and upon different places small bubbles, filled with a watery fluid, appear. This erysipelatous form of blood disease is called St. Anthony's Fire. The progress of the disease is a little slow, but nevertheless of a dangerous character; so that death in most cases occurs in from twelve to twenty-four hours, and in some cases even in a shorter time or suddenly. It is scarcely necessary to remark that not all the symptoms above alluded to are shown in every case of this disease; sometimes the disease causes such a rapid destruction that only a few of the described signs are allowed to mature. "Blood disease" is, however, easily detected, especially when several animals are affected with the same, either at the same time or one shortly after the other. There is scarcely any other disease which can be confounded with this; there are certain indications of wind-dropsy or swelling which show somewhat of a similarity to the symptoms of blood disease, which may possibly be mistaken; but in such cases all doubts in regard to the true cause can easily be removed by dissection, and also by other important diversities of both diseases hereafter to be described. The carcass of a sheep which died of blood disease putrefies in an uncommonly short time, the belly extending largely, a cadaverous smell becoming perceptible; and from mouth, nose and anus flows a thin, very dark-colored blood.

In many cases the skin is found to be of a bluish-red color, especially under the throat and upon the breast. The stripped skin shows upon different places accumulations of blackish-red blood, and the blood of the veins is not congealed, but liquid, and has the color of tar; the flesh is shriveled, of a bluish-red color and mellow. The abdominal cavity and intestines are filled with fetid air, which swells

the abdomen to its utmost capacity; a quantity of bloody water or blood is generally found in the cavity. The intestines are of a dark-red, and nearly black in color and overloaded with blood; the lungs and kidneys are shriveled, mellow and of a dark-red color; the bladder contains bloody urine, and in the windpipe a bloody, foam-like slime is to be found. The positive causes of the blood disease have hitherto not been sufficiently developed, but nevertheless unceasing diligence and attention have succeeded in establishing certain reliable symptoms, and also in finding proper remedies. In regard to the question of the general disposition, we know that the degree of fullness and thickness of the blood increases the prevalence of the disease, so that sheep feeding upon rich and abundant pastures are generally most disposed to become affected with this disease. The principal cause, however, consists in suddenly allowing large quantities of rich and very nourishing food to be given to sheep hitherto provided with scant or small quantities, by which means a sudden plethoric state is produced. Herds of sheep which receive only moderate food do not so easily become affected with blood disease. Another cause which produces plethora, and consequently blood disease, consists in want of exercise; and this is the reason that blood disease oftener prevails amongst herds feeding upon pastures of small dimensions than amongst herds which are allowed to roam and feed upon largely extended pastures. Other causes of said disease consist in the following: want of exercise among sheep kept in stables during the winter, feeding with plenty of swill, with musty clover, hay or stubble grass; want of good drinking water, especially during hot summer days; excessive heat; exposure to the rays of the sun, sultry and stormy air, overheated air in stables; over-driving; dampness of meadows which have been inundated; swamp air; unwholesome

drinking water, especially that in which flax has been steeped; spoiled fodder; all kinds of musty hay; rotten potatoes, carrots and other root-plants spoiled with mildew and rust. It appears, however, that all these damaging influences do not immediately cause said disease; it often happens that several of these circumstances combine their effects upon a herd without causing any apparent disease; whereas it often appears under circumstances where none or only a few of the above influences have been observed. It is therefore possible that some unknown causes may prevail; for instance, the particular composition of the atmosphere in some localities, the topographical situation of the country, the electrical influences of the air, sudden cold or other unknown influences. It is also possible that several of these causes may combine to produce disease. Up to the present time nobody has succeeded in sufficiently explaining this mystery. No age is protected against the disease; it may happen to the tender lamb as well as to the oldest sheep. Young sheep, however, are a great deal more disposed to it than older sheep. The disease may occur during all seasons of the year, in summer as well as in winter, but generally occurs during the hot season, mostly commencing in May, increasing during July, August and September, and diminishing during the following months. Sometimes it prevails during several years among a single herd or within an entire district, increasing and diminishing in its destruction or vehemence according to the temperature of the several seasons. The following special observations may further explain the subject:

1. In the hot season, although some cases may occur in winter, blood disease mostly prevails; during the summer the largest number of cases are observed during July, August and September, especially during long-continued heat and dryness, and particularly when the air is sultry or the

atmosphere is overloaded with electrical fluid before a thunder-storm. 2. A large number of cases occur upon pastures of a very abundant but loosely-constructed bottom, which is subject to sudden change from the influences of dryness or rain, by which influences the pasture may become drained or inundated in a very short time. 3. In deep valleys containing rivers and rivulets, where there is little draft of air, and the atmosphere is filled with ascending vapors, where the solar rays, after gliding down the face of the mountains, concentrate upon the bottom of the valleys, and no ventilation by drafts of air or wind taking place, the animal must suffer from such permanent effects. 4. Blood disease often occurs upon lands or estates with differently situated soil, where the vegetation is easily destroyed by heat and dryness upon the higher situated part, at the same time that abundance prevails in the valley, or a sudden change is produced after a rain. 5. Blood disease very often and generally occurs upon lands where the vegetation is subject to mildew or blight. 6. The disease also appears upon lands of a very loose and sandy bottom, which, together with parts of its vegetation, may be washed away or spoiled with rain, where there are no drains to prevent the formation of cavities in which vegetation may to some extent remain, and other parts exposed to rot or dryness. 7. It often happens amongst sheep feeding upon pastures which are from time to time subject to inundations. 8. It often happens amongst sheep which suddenly change from leanness to fattening. 9. Another cause of said disease consists in over-feeding with very rich and flatulent food amongst herds which are not accustomed to such feeding. 10. When over-feeding with grain and clover hay had taken place, the disease was generally observed to follow, even during winter. 11. The same thing happened when the stables were kept too warm. 12. The

disease also results from sudden colds in summer, when the atmosphere after a thunder-storm, and especially after a hail-storm, suddenly cooled off; also from colds at the washing and bathing of sheep, or from exposure when the sheep remain in sheepfold upon meadows which previously had been filled by rain. 13. The inhalation of swamp air in the neighborhood of small streams caused the spreading of this disease. 14. It appears that young sheep up to their fourth year are mostly disposed to suffer from this disease. 15. The disease is generally taken by the fattest and most playful animals of the herd.

A decrease or entire disappearance of this disease is observed under the following circumstances: 1. During the cold season. If the weather during summer-time continues to be cool, continuous rain causes the disease to disappear entirely. 2. It was observed that not a single case occurred amongst one part of a certain herd which was in stables and fed with dry food, whereas the other part of the same herd was feeding upon the meadow. When the animals were taken from the meadow into the stable, a decrease and entire disappearance of the disease took place, as likewise when the herd was transferred from rich and abundant to barren pastures, from the valley to the hill, or to such pastures as contained little or so-called acidulous food. It has been generally observed that the disease abated as soon as a change was effected, whether it arose from a transfer to different pastures, which produces a change of mastication and nourishment, or from a change to different places. Diseased animals have been cured by allowing them to feed upon potatoes. 3. Old or lean sheep are not so often afflicted with said disease as young or fat animals.

As in all epidemic diseases, it may be questioned whether this blood disease is not also of a contagious character. It has been proven that when healthy sheep have been

vaccinated with matter obtained from sheep which died in consequence of blood disease, the former always died in consequence. Dogs which were allowed to eat such carcasses did not die, whereas sheep bitten by such dogs always became afflicted with the disease. It may also affect mankind if transferred by eating such diseased meat, or by the sting of an insect or by touching of the flesh, the skin or the blood of an infected animal. I can bear witness that in the year 1849 three shepherds belonging to an estate near Magdeburg, Prussia, died in consequence of having contracted this disease by contagion. Whether the disease may be transferred to other sheep, either by air or breathing or perspiration, cannot be determined with certainty. Horses and goats which smelled at the carcasses of such infected sheep suffered from the disease; it was, however, not proven whether the mouth or nose of these animals had been soiled with blood of such carcasses. It is therefore necessary to recommend the most careful caution, especially with men, whenever it becomes necessary to touch such carcasses or diseased flesh. To prevent the spreading of the blood disease it is advisable to part the diseased animals from the healthy, and to give in the morning and evening the following lick, consisting of two pounds of saltpetre, two pounds of glauber salts, two pounds of ground calamus, two pounds of laurel-leaves, two pounds of juniper-berries, one pound of golden sulphur; which may be mixed with the food (clover being preferred). The above quantity must be mixed well, and serves for one hundred animals for two days, morning and evening. I can recommend the above remedy as the most efficient. Great care must be observed in regard to feeding, so that the change from stable-feeding to pasture-feeding is only to be allowed by degrees. In the morning the sheep must not be driven to pasture until the dew and moisture have entirely disappeared

from the meadow, which depends upon the temperature and weather. At noon a shady and cool resting-place must be provided. Another preservative, as well as preventive, consists in the application of cold shower-baths, which may be applied to the herd by means of a squirting engine, the nozzle of which is provided with a sieve, or by means of a garden-spout; the cold water to be applied at different times of the day, and until the animals are perfectly cooled. The herd may also be driven into cold or refreshing streams: in case of rain the herd must be allowed to remain under the same at their pleasure. There appears to be a hereditary disposition to said blood disease; it may therefore be presumed that in case of an extraordinarily frequent occurrence amongst certain herds, the sale of the same and the purchase of other stock will prove the most profitable.

SHEEP POX.

One of the most destructive diseases amongst sheep is "the pox." This disease has been known since the year 1698, but its origin is entirely unknown. It is perhaps the same case with this disease as with the human pox, which is said to have been imported from the East by contagion. It has been suggested that sheep pox may also have originated in the Western part of the world, from the influences of the weather, from mildew and other causes; but this has never been sufficiently proven, and it is therefore unnecessary to enter into any dispute. From authenticated observations it appears that the pox has reappeared in certain countries during certain intervening periods of eight, ten

or twelve years; whereas in other parts the reappearance of said disease has not been observed during fifty years. The local situation, the climate and commercial intercourse are very important matters in regard to the formation of said disease. We therefore find that pox is very often imported from foreign countries. Sheep pox may appear at any season and independently of all exterior influences or of the individual constitution of the animal; affecting the sheep in winter or summer, during the wet and dry season, and befalling young as well as old, healthy as well as sick animals. It seems, however, that certain peculiar qualities of the atmosphere, of the weather, etc., produce an increase or decrease of the disease.

Sheep pox consists in a feverish, inflammable eruption of the skin, which is mainly discernible by the formation of inflammable pustules or protuberances upon the skin, secreting a particular fluid, and becoming covered with a certain crust, which at last drops off. The disease is contagious in the highest degree, and infects the same animal only once during its life; so that a sheep which has once overcome this disease will never be again subject to it.

The incidents and progress of this disease are mostly very regular and subject to certain rules. There are four distinct periods discernible during the progress of said disease, of which periods each occupies a certain time and presents certain appearances. These periods are called, 1, the period of contagion; 2, of eruption; 3, of ripeness or maturity; and 4, of healing or drying off.

1. *Period of contagion.*—Several days (sometimes three or four) after contagion has taken place, the sheep appears to be sullen and weak, head and ears drooping, eating and ruminating less than usual, and showing an increased warmth of skin, especially about the ears. The symptoms, although appearing of so small importance that they are

often overlooked, last for two or three days, after which the disease enters into its second period.

2. *Period of eruption.*—This period begins on the sixth or seventh day after contagion has taken place. There appear scarlet-red spots (similar in appearance to flea-bites), of different sizes and number, upon different parts of the surface of the skin, and especially upon such parts as are not covered with wool, such as the inner side of the shanks, the part of the breast where the fore legs join, the testicles, the lips and the eyelids. Such red spots are sometimes not larger than half an inch; sometimes only a few are to be found, but oftener a very great number may be observed upon one particular portion of the skin. In the centre of these red spots, which are then very little swollen, there appears after twenty-four or thirty-six hours a small, protuberant and very inflammable pustule, which extends deep into the skin and is very painful in case of pressure. This small pustule extends in size during the next day, arching upward, and arriving on the tenth day after contagion to its full form and size; the form being now in most cases circular, seldom oval or otherwise, appearing like a section of a ball. The smaller pox are generally high in construction, and the larger pox flatly constructed. The size of pox varies from that of a pea to a hickory nut. During the aforesaid growth of the pox the size of the red spot diminishes, and the pox itself receives a red circumference. At the eruption of the pox, and for several days after, a very vehement inflammatory state of the whole body of the animal is observed; the sheep being very sick, eating and ruminating very little, showing great thirst, standing with its head drooping and legs close together; the walk is stiff and difficult, and the animal preferring to remain upon one spot. This difficult walk is generally the first indication of the presence of the disease. The head,

ears, mouth and affected spots of the skin are of extraordinary warmth; the gums, tongue, and eyes are very red, hot and dry; the breathing increased. Toward the end of the second period a clear, thin slime flows from the nose and eyes, as if affected by neuralgia; and when the lips, eyelids and the head contain a great number of pox, such parts are often swollen to such an extent that neither mouth nor eyes can be opened.

3. *Period of maturity.*—This period generally begins on the tenth day after contagion, and extends until the thirteenth or fourteenth day; in this time the indications of the former period (such as the inflammatory state) diminish by degrees. The pox upon the centre and apex of the skin shows a fading color, the pustule becoming of a bluish-white color; the redness disappears from the inner part to the exterior; the red circle becomes paler and smaller. The upper skin of the pox separates from the bottom, and between both an exudation of a clear, colorless, translucent and adhesive fluid (the so-called lymph) takes place, by which the upper skin appears as a transparent bubble. During the next ten days the pox become paler, the surface of the same becoming less transparent, thicker and of a pale white color, the red circle disappearing entirely. On the thirteenth or fourteenth day the pox arrives at its full maturity or ripeness, being now of a clear white color, round and sometimes of a conical form; the upper skin is very thin and of a chalk-white color, covering the so-called clear lymph in great quantities, which at the opening of the mortified upper skin flows in larger or smaller quantities. By separating the epidermis from the base of said pox, the base appears of a dark red color and spongy construction, and extends somewhat above the skin. As soon as the period of maturity begins, the feverish and other general indications diminish by degrees; so that after a

few days they entirely disappear, the sheep becoming lively again, the appetite reappearing, the discharge from the nose and mouth ceases, as likewise the swelling of the lips and eyelids, and the walk and movements become again free and easy. Only in case of an extraordinarily large number of pox, or in case of an irregular progress, some of the above-described incidents remain, such as the discharge from the nose and eyes, by which the latter are closed, the want of appetite and a difficult respiration.

4. *Period of healing.*—On the thirteenth or fourteenth day after contagion, or six or seven days after the eruption of the pox, the latter begins to heal and dry off, lymph becoming turbid, yellow and similar to suppuration; the pox growing flat and shrinking; the upper skin deepening in the centre; and after the next four or six days the entire pox, together with the lymph, forms into a hard and dry scab, which drops off and leaves a reddish, dry, scarcely perceptible mark, which at last entirely disappears. This last or so-called healing period lasts from four to six days; so that the entire duration of the disease occupies about eighteen or twenty days.

In most cases the eruption of all the pox takes place at one and the same time, except when an animal suffers from too large a number of the pox, the eruption of which may follow in short succession; in such exceptional cases, however, the interval of the different periods occupies only a few days. In all cases which I observed a regular succession of the aforementioned periods took place. When the disease occurs under the regular, and so to speak natural, progress, the pox is called "innoxious pox." This is, however, not always the case: numerous interior and exterior known and unknown influences alter the nature of the disease, and render it a most destructive plague. Under such circum-

stances the pox is generally called "malignant pox," which generally presents the following indications:

Several days before the eruption of the pox the animal appears very sick, ceasing to ruminate and eat, and being weary and enervated. Subsequently the pox breaks out upon nearly the entire skin, particularly upon the lips, the jaws and eyelids, and upon the bare parts of the shanks. The affected parts of the skin are hot, swollen and stiffened; the lips and eyelids especially are swollen to a large extent, such swellings being extremely sensible to the touch or motion. These pox are very numerous and larger than in innoxious pox, being of a lengthy or oval form, whereas those of the innoxious pox are of a circular form. The pustules in malignant pox are apt to flow together, and by that means to form large and shapeless protuberances and irregular figures; such pox are not very high, are flat in the centre, and, instead of being arched, their surface appears to be depressed; the color of the pox, as well as of the intermediate parts of the skin, is either scarlet, red, coppery, purple or bluish-red. It is extremely seldom that malignant pox takes the same regular course as innoxious pox; the pustules do not arch or swell in the centre, they do not fill with lymph, and do not change to innoxious suppuration and into a dry crust; but they remain in most cases in the same condition as above described until the death of the animal. In many cases they entirely recede before death; sometimes they fill with a thin, acrid matter (instead of lymph), and change into deeply extending ulcers (instead of dry crust), thereby destroying large pieces of the skin, especially of the face, the ears and shanks. The affected sheep is scarcely able to move from place to place, and does not move without compulsion; the animal is unable to move the lips and jaws, which are hot and swollen, and feel as if filled with knots and boils; it ceases to eat, the

eyes are entirely closed, and the head appears to be swollen. The sheep is extremely sick, drooping its head and keeping its feet close together, with crooked back, difficult and increased respiration. The entire surface of the body, especially the mouth, nose, lips and bare parts of the shanks, is greatly inflamed, very hot and sensitive; the animal suffers extremely from thirst, and cannot drink without difficulty, on account of the inflammation of the lips. In the first few days after the eruption of the pox, the mouth and nose discharge a certain spittle or slobber, consisting in the beginning of a thin fluid matter, which in a short time changes into a thick, tough and yellowish-white slime, and which in some cases is intermixed with bloody streaks; this slime, as well as the entire perspiration of the sheep, has an extremely offensive smell. The former generally hardens around the nostrils, forming a compact, tough and dark-colored crust; at last filling the nostrils to such an extent that breathing is rendered almost impossible. The mucous membranes of the nasal cavities are inflamed and swollen, the nostrils become choked, the breathing difficult, causing a rattling noise, as also uneasiness to the animal. The swollen eyelids are closed, the eyeballs being very red and inflamed; there is a discharge from the eye; which discharge in the beginning is watery and thin, but afterward changes into a thick, suppurated matter, and by its adhesion to the eyelid causes the closing of the eye. In many cases a suppuration of the entire eye takes place, especially when the eyeball itself is affected with pox. The sheep staggers and reels, or prefers to lie down, and when lifted drops down again; the wool separates easily from the skin, which is entirely covered with pox; the flanks are sunken and hollow, the animal becoming extremely lean and afflicted with dysentery, which is generally followed by death. The disease, in receding shortly before its termination, sometimes

changes into an inflammation of the throat or lungs, this being the most reliable indication of the near approach of death. Death generally occurs in from sixteen to twenty days, seldom sooner, and then only in cases where the pox has receded or changed into inflammation of the throat, or when the afflicted is of a very tender age. The diseased carcass putrefies in a very short time and causes a pestilent stench. When dissected, a great many pox are found upon the mucous membranes of the nose and windpipe, upon the lungs, the liver, the intestines, the tripes; which pox, however, have not exactly the same appearance as those of the exterior pox, looking like flat-formed sores. The pox, not always appearing of the same exterior form, have been classified accordingly, and different names have been adopted to distinguish such different forms; as, for instance, confluent, gangrenous, flat, brown, blue and pestilent pox. Such a classification is, however, entirely unnecessary, as there is only one kind of sheep pox; the difference in the progress and exterior appearance depends upon exterior and interior conditions and incidents, and not upon the intrinsic nature of the pox itself. To prove this it is only necessary to state the fact that the so-called confluent and gangrenous pox may be transferred by contagion to animals afflicted with innoxious pox, and the latter may, by injudicious treatment or with intent, be changed into the most malignant and so-called flattened pox. The most proper classification appears to be that of "innoxious" and "malignant" pox, or perhaps "regular" and "irregular" pox. The so-called "stone pox," which seldom occurs, has nothing to do with this disease, and its name as "pox" is improper. The so-called stone pox consists in small knots of the form of millet-seed, containing a small quantity of yellow matter, which dry off in a period of four or five

days, produce no fever, are not contagious and of no dangerous consequences.

The sheep pox is one of the most destructive diseases, destroying all kinds of animals alike. The devastation caused by this disease is indeed enormous. It has been stated that out of eight millions of sheep, one hundred and fifty thousand have been destroyed by it in one year in Hungary; and it is officially reported that the loss amongst herds in Austria (which amounted in the aggregate to about sixteen millions of sheep) has not been less than four hundred thousand sheep per annum. This official report was made at a time when vaccination for sheep pox had not yet been introduced. We are therefore enabled to form an idea of the dangerous consequences of such a disease. It has been calculated that the average loss caused by sheep pox amounts to from eight to ten per cent. This calculation, however, is not always to be relied upon. I have observed average losses of about six or eight per cent. under favorable circumstances, and losses varying from twenty to thirty and even from forty to sixty per cent., according to the vehemence of the disease or the effect of local and other influences. Last year I observed a case in England, in which, out of a herd of three hundred sheep, ninety-nine were destroyed by sheep pox, amounting to nearly thirty-three per cent.

We have now to consider the effect of sheep pox upon the animal itself, and in this we should be guided by the following rules, founded upon experience: The number of pox indicates the degree of danger. The less the number, the less the danger, and with the increase of their number the danger increases, because in the latter case the pox flow together and form the so-called flattened pox. When there are only a few pox and their progress is regular, when such pox are separated from each other, when

they are of a circular and spherical form, discharging lymph which hardens into a crust,—then the disease is innoxious and never of deadly consequences. Such indications as fever, want of appetite, discharge from the nose, etc., do not generally in such cases prevail, and we observe scarcely any indisposition of the animal at all; the only observable indication then consists in the formation upon several spots of the skin of a dry, dark-brown scurf of the size of a pea. Such cases occur very often among large herds. When there are great numbers of pox, especially upon the lips and the head, then the disease becomes more critical, being in most cases accompanied with fever, discharge from the nose and want of appetite. But nevertheless there is little danger in such cases, provided that the pox are of a circular and arched form, and that they discharge lymph, which hardens into a crust or scurf. The animal may of course become emaciated, or may lose an eye or a part of the wing of the nose, etc., but death occurs very seldom. The following indications present a larger degree of danger, viz.: when the animal appears to be very sick in the beginning of the disease; when there is a want of appetite and cheerfulness; when the lips and eyelids, or the entire skin of the head, are swollen; when the eruption of the pox occurs upon all parts of the body; when the pox are so numerous that they become confluent and of shapeless form; when they remain in a flattened condition; when the skin between the pox is highly inflamed and of the same color as the pox; when in the beginning of the disease a discharge from the nose is observed; when the respiration is difficult and accompanied with a rattling noise. In such cases the strength of the animal becomes prematurely exhausted by the vehemence of the fever and inflammation, the body being then very often unable to stand the regular course of inflammation, so that the pox

cannot mature or discharge the lymph and change into scruf. In a few such cases the animal may be saved by means of great care and attention, but most are hopeless. The most unfavorable indications, which are nearly always followed by death, are as follows: confluent, dry and flattened pox, of a coppery, purple or bluish-red color; when the pox affects large and important parts in such a manner that the latter are destroyed by suppuration; when there is an entire loss of appetite, an abundant discharge from nose, mouth and eyes of fœtid matter, which the animal refuses to lick; when the pox recede or change into inflammation of the throat or lungs or into dysentery; and when the animal is unable to stand. All animals of the same herd do not suffer in the same degree of vehemence from the disease, even under the same circumstances, such as weather, pasture, food, care, etc. It has been observed that improved or superior stock is more liable to destruction than ordinary stock; young sheep (except sucklings) do not suffer so much as old sheep. Sucklings die very soon in consequence of pox—often in the first few days after eruption, and even before. Sheep which have been well fed, especially bucks, suffer the most; ewes in advanced states of pregnancy suffer greatly from the pox, and generally miscarry in consequence thereof. Sheep which feed upon stubble-fields, or which are lean from want of sufficient food, are seldom much affected by pox.

The following rules in regard to the influence of the weather or season are important: Extreme heat and extreme cold (especially the former) are dangerous: wet weather is most dangerous, and a heavy rain may destroy half of the herd if the animals are afflicted with pox and exposed to such rain. A mild, temperate atmosphere, rest and moderate feeding are of a beneficial effect in case of pox. There are, however, certain periods or years in which the pox appears to be more or less dangerous in its con-

sequences, and in such periods certain unaccountable influences, such as an unknown state or composition of the atmospheric air, may exist. Sheep pox is of a very contagious character; of this there can be no doubt at all. All parts of the diseased animal contain contagious matter, especially the lymph, the blood, the discharges of the mouth and nose, the dung, the urine and the exhalation of the skin and lungs. Contagion may result either from immediate contact with said infected parts, or from the transfer of the poisonous matter by intermediate means or poisonous air. Contagion is generally introduced into a herd by single animals, which are or have been afflicted with pox, by means of the wool or skin of such animals, or when healthy animals feed upon pasture where diseased sheep have been roaming. The disease may also be transferred by contact with infected clothing of men, especially fur, and even by dogs and poultry. The contagious matter of the pox, being of a volatile nature, can consequently become diffused by air. It is not known to what extent such a diffusion may effect contagion; it is, however, probable that within several hundred years such a diffusion may prove fatal. It is extremely seldom that pox breaks out in a single herd without any previous appearance of said disease in some other part of the neighborhood. The manner in which such infection from one remote locality to the other has been effected has been never sufficiently explained, except in a very few cases. Such sudden and unexplained attacks only prove the intensity and subtilty of the contagious matter of sheep pox. Such matter preserves its nature and effects for a long time, even in the dry state, and long after the disease itself has ceased to exist. In the beginning only a few animals of a certain herd are affected by pox (probably from immediate infection). It never happens that the entire herd, or the larger

part of the same, is at once taken sick; if, however, such a case is observed, the owner of such an entirely diseased herd may be assured that either he or his employés have neglected the care of his flock. Sheep pox always spreads gradually, and lingers according to the state of the temperature of the air. Infection is accelerated by heat, and consequently when sheep are closely kept together in stables during winter-time the disease is very likely to appear. Sheep kept upon cool pastures during wet and windy weather are not so vehemently affected by pox. The average term during which all animals of a large herd become gradually afflicted with pox lasts from three to four months, and in some instances six months. The general rule is, that the shorter the interval of infection the greater the vehemence and danger of the disease, and *vice versâ*. In most cases there are three periods in regard to the progress of infection: The first period begins with the infection of a few animals, which then (in the second period) infect about the third or fourth part of the herd. After a short interval or rest of about sixteen or eighteen days, these infected sheep impart the disease to the remaining healthy part of the flock (third period). This may be a consequence of the arrival of maturity in each separate case, which maturity happens in nearly the same equal period. Certain animals are more or less disposed to infection, and this may be assigned as a reason why such animals do not become infected at all, or sooner or later. It may be said in this connection that in the average about four to six per cent. of the sheep belonging to a diseased flock are entirely exempt from infection on account of their constitutional disposition. It is extremely rare that all sheep composing a herd are likewise exempt,

The treatment of an infected herd depends upon different circumstances, although the greatest care has to be

observed in all cases where the disease is known to prevail in distant localities, whereby infection may happen sooner or later. As soon as it is known that the pox prevails among a herd, each separate animal has to be carefully examined by laying it upon its back and examining the bare parts of the shanks, of the belly, the breast, and also the face, especially the lips and eyes. In the beginning of the disease the pox are scarcely visible, and therefore the lips of the animal must be gently touched or rubbed with the finger to detect any knotty and rugged protuberances, which, when they are sensible to pressure, represent the pox. All infected sheep should be separated from the others and taken to very distant localities. If, however, a large part of the herd is found to be diseased, it is advisable to keep the infected animals in their usual place or stable, which is now considered to be also infected, and to remove the healthy to other localities. In case of infection of only a few animals, and when the disease is still in the beginning, the spread of the disease may possibly be prevented, but such cases are very rare and unreliable. The aforesaid examination is daily to be repeated; the person having the care of the diseased animals is not to be entrusted with the examination, nor to be allowed to have any intercourse with the healthy part of the herd.

The treatment of the regular or innoxious pox is very simple and requires no medical attendance, it being only necessary to subject the diseased sheep to a suitable and careful diet. In winter, and during cold, windy, misty or rainy weather, they should be kept in the stable; cold and wet being of the most dangerous effect, the sheep being very sensible to such influences, notwithstanding the thickness of their fleece, and especially when the tender skin is inflamed and swollen from pox. The stable in which the sick animals are kept must be spacious and warm and pro-

vided with plenty of dry-litter, a temperature of sixty to sixty-five degrees Fahrenheit being the most popular. During clear and warm weather the diseased sheep may be taken upon a dry and nourishing pasture; care must, however, be observed that such animals are not overheated by too much exercise, and for this reason it is proper to keep them in the neighborhood of the stable or some sheds, so that in case of a sudden rain sufficient shelter may be had at once. During very hot summer days the sheep must not be exposed to the sun, especially at noon, excessive heat resulting in dangerous consequences. During the night the sheep must be kept in stables, as the night dew and sudden rains interfere with the regular course of the disease. There is always a smaller or larger number of exceptional cases in a diseased herd (of innoxious cases), where the disease appears to be of an irregular or malignant course or form. Such individuals must be treated with the greatest care; they must be separated from the others, and if possible taken to another locality, as by their perspiration the air becomes tainted and poisoned, and of dangerous effect upon the other diseased animals. They must also be kept in warm and dry stables, or upon grass-plots, or upon meadows situated in the immediate neighborhood of the stables.

A particular medical treatment is very difficult; the endless varieties in regard to constitution, age, etc., of the diseased animals, as well as the many different degrees of the vehemence of the disease, render it impossible to give general prescriptions; the employment of medicaments being a costly matter and of little or doubtful use, and, where there are hundreds of diseased animals, almost impossible. It is therefore advisable to confine the diseased animals to a proper diet and diligent care. They should always receive the best food, such as clover hay, potatoes cut into small pieces,

etc. The drink should consist of clean water mixed with a little ground salt or a small quantity of vinegar. Animals whose lips are swollen to such a degree that they are unable to eat should be fed with drink composed of water and flour or bran, which, in case of refusal, may be repeatedly poured into the mouth; otherwise the animal must die from starvation. Such infusions may properly consist of barley groats, to which a little ground salt is added. The eyes, which are closed from inflammation and hardened matter, must be washed, and the matter removed by means of bathing with lukewarm water or milk. The nostrils, which are in like manner obstructed, should also be bathed, and the obstruction carefully removed. In case of necessity, the administration of medicines, as likewise the special treatment of local diseases, such as inflammation of the eyes, joints and sockets, throat or lungs, must be entrusted to practical and experienced persons. As soon as it is ascertained that pox prevails amongst a herd, such a fact ought to be made known to the neighbors and authorities, so that the spreading of this dangerous and devastating plague may be in due time prevented. When sheep pox has ceased to exist in a herd, the poisonous matter has to be destroyed as far as possible. The carcasses of all such diseased animals must be interred as deep as possible, together with skin and wool; the dung should be ploughed under. The walls, stalls and all other fixtures of the stables or sheds in which infected animals have been kept must be whitewashed; and to make such disinfection more effective, a certain quantity of chloride of lime must be added to the whitewash (say about two pounds of chloride of lime to a pailful of whitewash). Many have been of opinion that the employment of certain medicaments would be a means of preventing or abating the disposition to sheep pox, and it was therefore recommended to rub the animals under the

throat with a mixture consisting of lard, one pound; camphor, a half ounce; and assafœtida, a half ounce. Although for a certain time such a treatment enjoyed a certain reputation as a preventive, it was subsequently found to be inadequate, and of as little use as all other remedies. There is still another remedy to be mentioned (besides vaccination, of which a full description will be given hereafter). Such a remedy, although also of doubtful consequences, consists in all possible measures by which the transfer of the pox from and to other localities may be prevented or rendered impossible, especially when it is found to prevail in neighboring places. All persons, all animals or things which have been in contact with a diseased herd must be kept separated from healthy herds, and the latter are not to be permitted to feed or roam upon pastures, ways or passages (or in the neighborhood of such pastures, etc.) which have been used by diseased animals: a distance of at least four hundred yards from such infected places ought to be carefully observed. Notwithstanding all such precautionary measures, pox has often appeared in such separated herds, and the owner of the stock is therefore unable to account for such unexpected and unavoidable attacks.

Vaccination of Sheep Pox.—After enormous losses in sheep, and after all other precautionary measures proved to be of no effect, vaccination was at last thought of. It was already known that the so-called human small pox could be prevented by vaccination, and sheep pox being very similar in its nature to human pox, the idea of preventing it also by vaccination was indeed easily conceived, and proved beneficial in its results. Since the introduction of vaccination, sheep pox has ceased to be a perpetual plague to whole countries, and only occurs amongst single herds or in limited districts. Vaccination consists in the intentional and artificial production of a disease similar to

sheep pox, but of a very gentle and innoxious nature, by which means the liability of the vaccinated animal to become afflicted with the natural and more vehement or malignant disease is destroyed. In other words, vaccination is the production of a mild disease as a safeguard against a more vehement one. Vaccination is effected by introducing a small quantity of pox-matter under the epidermis of the animal by means of a small incision. Vaccination was formerly vehemently opposed by many persons on account of the unsatisfactory result of several cases of vaccination; which results were no doubt produced by improper treatment and a combination of other unfavorable circumstances.

Like all other valuable and beneficial inventions, vaccination has had its trials and obstacles, until at last, success crowning its own merits, and being more generally introduced, certain rules in the manner of operation were established according to experience; so that at the present time only a few opponents may be found, and those only among ignorant or prejudiced people. The most important advantages of vaccination are as follows:

1. Natural pox generally destroys from twenty to fifty per cent., and sometimes even a larger percentage, of an infected herd, a destruction of only eight or ten per cent. being a very rare and fortunate exception; whereas the destruction among vaccinated sheep very seldom exceeds four or six per cent.; in many cases there is a still smaller loss, and sometimes no loss at all. I recollect a case in which out of a herd of forty thousand vaccinated sheep only ten animals died. 2. Natural pox generally prevails in an infected herd from three to six months; whereas a vaccinated herd is relieved from pox in four or six weeks. 3. The amount of wool destroyed by the disease of infected animals is a very considerable loss, no such loss occurring

amongst a vaccinated herd. 4. Natural pox may happen at all seasons of the year and under all possible circumstances, whereby another considerable loss may be incurred by the infection of ewes, which destroys the ewes as well as other lambs; but vaccination can in most cases be postponed until a proper time, and the loss thereby in some measure avoided.

The above-mentioned facts alone are sufficient to show the manifest advantage of vaccination, a still greater benefit being, however, observed when such vaccination is undertaken in due time, inasmuch as even the best remedy may lose somewhat of its effects if applied too late. Consequently, if a herd is already afflicted with pox, only the disinfected or healthy animals can be vaccinated with a beneficial result; and even in such cases a great many sheep may be saved and the duration of the disease considerably shortened. A vaccination undertaken under such circumstances is called "vaccination in distress." Such a vaccination, although of comparatively less benefit, ought to be undertaken under all circumstances, except upon ewes going with lambs; in such cases, the ewes should be examined daily and the healthy separated from the infected, until the danger of infection appears to be removed, which will be more fully explained hereafter. When the disease is known to exist in the neighborhood, the owner cannot do anything better than to vaccinate his flock, and by this means to prefer a probable and small loss to a large loss of an uncertain extent. In such a case we call such an operation "precautionary vaccination," and it is always advisable in the case named. Experience proves that all other precautionary measures are inadequate to prevent the transfer of sheep pox from one locality to another; and if such a precautionary vaccination is neglected, vaccination in distress may be afterward required, and a partial

result only obtained. There is still another or third class of vaccination—"preventive vaccination"—which consists in the continual yearly vaccination of the grown-up stock, or animals born since the last regular vaccination of the herd. Such a preventive vaccination of course offers great advantages over the so-called "vaccination in distress" and "precautionary vaccination," allowing the free choice of proper season and of other favorable circumstances, and causing only an inconsiderable loss. In many countries, especially in Austria, such a preventive vaccination is generally in use: the grown-up lambs are regularly vaccinated in the spring, when such lambs are from three to four months old, the general result being a very considerable diminution of the former devastations caused by this plague. There are, however, certain parts or countries where the recurrence of pox only happens in very distant periods, say in ten or twelve years, and even more seldom; and on account of the short duration of the life of sheep no danger may exist during several generations; so that preventive vaccination is not required and is unnecessary. Such preventive vaccination is therefore only to be recommended for particular localities and under particular circumstances; that is to say, for those localities in which sheep pox is known to recur after short intermissions. A timely and properly executed "precautionary vaccination" is in most cases sufficient to prevent losses from infection.

The selection of vaccine-matter is of the greatest importance, inasmuch as only by means of proper vaccine-matter a reliable prevention of a vehement or malignant disease can be effected. All parts of an animal afflicted with pox, especially the dung, urine and other discharges, the blood and other humors or fluids, are contagious, but probably only during certain periods of the disease. It is therefore necessary to establish certain rules for the selection of the

proper vaccine-matter and for the use of the same at a proper time, otherwise an unfavorable or dangerous result may be the consequence. According to experience, segregated lymph forms the best vaccine-matter; such lymph is to be collected from natural pox, on the sixth or seventh day after eruption. It must be perfectly clear and fluid, like water. Thick, turbid and suppurated lymph produces in most cases no pox, or only a sore, and the use of the same offers no protection at all. It may, however, happen that a sufficient quantity of clear lymph cannot be obtained from natural pox (especially when there are great numbers to be vaccinated). In such a case the blood emerging from the incision of natural pox may be used as a perfectly satisfactory substitute for lymph. Among the sheep which I have had occasion to vaccinate, at least thirty thousand have been vaccinated with such kind of blood (for want of lymph), and the result proved to be entirely of the same satisfactory character. The same observation occurred to many other professional men and owners of sheep. It appears, therefore, that no difference exists between vaccination with clear lymph and that with the blood or bloody fluid of the pox; if, however, plenty of lymph can be had, the latter is preferable. In case such clear lymph cannot be procured, the blood must be taken from pox which has arrived at the so-called state of maturity, especially when such pox still contains a small portion of clear lymph; the upper skin of such pox must be of a bluish-white color and already separated from the textures below. Care must be taken to select only such pox the maturity of which is not already perfected; the blood of perfectly ripened pox (being covered with a very thick and perfectly white skin and tending to fall off) is in many cases of no avail. It is further advisable to take the vaccine-matter from young, strong and otherwise healthy animals, where the pox is of

a regular course or progress, and where the animals do not suffer from vehement inflammation or general bodily affliction. If vaccine-matter is transferred from sheep suffering from pox together with chlorosis, or so-called green sickness or rot, the effect of such matter is destroyed; the vaccination results only in the formation of a sore, which renders no protection and no formation of further useful vaccine-matter. It has been also ascertained that other diseases of sheep cannot be transferred or propagated by vaccination with matter obtained from such otherwise diseased animals. Suppurated matter or blood obtained from overripe pox destroys the intended effect of vaccination, and in some cases natural pox is the result of such improper treatment (from which result ignorant people are inclined to believe that vaccination is always a failure). It is further preferable to obtain vaccine-matter from vaccinated sheep; and in case no such matter can be had, it should be obtained from infected animals whose pox is of a regular and of the least vehement nature. Natural pox are smaller than vaccinated pox, and consequently only a small quantity of lymph can be obtained from the former; for this reason the blood from natural pox during its proper maturity must be used. Lymph may be preserved for a considerable time without losing anything from its effects; for this purpose it should be collected in very small vials, or so-called capillary tubes, which must be carefully corked and sealed up with cement or wax, and kept in a jar filled with sand, and in a cool place. In this way the lymph may be preserved from four to ten months. Another means of preserving vaccine-matter consists in collecting it by means of wool or cotton, to be carefully sealed up in glass vessels. There are, however, certain exceptions recorded, in which the most carefully preserved vaccine-matter has, after a short time, lost its effective power. The preservation of lymph having in

several cases proved inefficient, and there having been a difference of opinion in regard to the efficiency of "precautionary vaccination," the establishment of certain so-called "vaccine depôts" was suggested, and such institutions have been duly established, in connection with large estates, in some parts of Austria. The proper management of such vaccine depôts, which involved considerable expense and great care, consisted in the separation of small flocks, keeping the same at some remote and isolated spot from the main flock, and vaccinating only about ten animals of such separated flock; from these a single animal possessing the most favorable qualities was selected from which to obtain the vaccine-matter, by which another lot of ten sheep were vaccinated, and so on until the arrival of the proper time for the vaccination of the entire grown-up stock. Such a mode of operation offers, of course, the surest means to have good vaccine-matter of sufficient quantity on hand when required. But this mode of obtaining and preserving good vaccine-matter was not the only object or purpose of such institutions; it was also believed that such repeated transplantation or propagation of lymph through a large number of healthy sheep would at last produce a very mild and entirely innoxious form of pox, without lessening the protective virtues of the vaccine-matter of the same; thereby also avoiding a general infection or death from such disease. Such a supposed mitigation was called "Culture or mitigation of vaccine-matter," and such vaccine-matter was said to possess the following advantages over vaccine-matter obtained from natural pox, namely: 1. Cultivated vaccine-matter was said to be of the same preventive power against infection from natural pox as matter taken from the latter. 2. It was believed that cultivated vaccine-matter is rendered milder by each further transplantation, forming only a single pox upon the vaccinated spot, and avoiding a

general or dangerous pox disease. 3. It was also said that sheep vaccinated with such cultivated matter (on account of its mild nature) could be kept amongst other sheep without infecting the latter, thereby avoiding any danger to neighboring herds. The first assertion is perfectly correct, inasmuch as the vaccine-matter does not lose any of its power of protection by any number of transplantations. The two other assertions, however, are incorrect. Although there may be some apparent reasons for the same, experience proves their utter fallacy. I recollect that the loss in two very large herds which I had vaccinated with matter obtained from natural pox only amounted to one-half and to one per cent. respectively; whereas the loss among herds vaccinated with cultivated matter (of the tenth or twelfth migatory degree) amounted to from two to four per cent. respectively. I was also informed by the master-herdsman of a large estate in Austria that the losses among his herd, which had been vaccinated from cultivated vaccine-matter obtained from one of the above-mentioned vaccine depôts (such matter having been transplanted more than one hundred times), amounted to twelve per cent., although all other precautionary measures had been duly observed.

The selection of proper places for vaccination is of great importance. When vaccination was first introduced, it was thought proper to execute the operation upon the interior and bare part of one of the fore legs: such treatment was, however, abandoned, the effect of the same being a very dangerous friction, causing inflammation, lameness of the limb and a large number of pox. To avoid such friction the interior and bare parts of the hind leg were then selected, the result being, however, the same. Subsequently, the lower part of the abdomen, near the navel, was tried, and also found to be an improper place for vaccination. After many trials and experiences, it has been

generally admitted that the most suitable place for vaccination is the inner side of the ear, being very convenient for operation, and offering in most cases the greatest advantages in every other regard. Vaccination has been also effected upon the tail, and although the sheep suffered no inconvenience, and the result being the formation of a large pox, whose preventive power is undeniable, it appeared, nevertheless, that the inner side of the ear offers greater advantages than all other methods of vaccination. It must be also here remarked that a greater quantity and better quality of lymph is obtained from so-called ear pox than from tail pox.

Mechanical system of vaccination.—There have been many different ways of vaccination; as, for instance, several small incisions were made into the skin and the vaccine-matter rubbed thereupon; or a woolen or cotton thread soaked in lymph was drawn through the ear or other parts of the body under the skin; but, after all, the ear was selected as the most proper place. In front of the open door of the stable a hurdle is placed, and in front of the latter a table and a chair for the accommodation of the operator. The sheep from which the vaccine-matter is to be taken must be laid upon a bench to the right of the operator, the sheep to be bound by its legs and to be held by an assistant. The animals which are to be vaccinated are now taken from the stable, and one after the other laid upon the table, with their backs downward. Another assistant holds the hind legs with his right hand and the fore legs with his left hand, pressing the neck of the animal under his left arm. The operator now holds the tail of the animal with his left hand, turning or twisting the tail in such a manner that the bare part of the skin becomes somewhat compressed; in the mean time, the assistant uses the dull edge of the needle (used for vacci-

nation) to remove any dirt adhering to the pox, and opening the white upper skin of the same by means of incisions, catches the lymph into the receiver or furrow of the needle, which he now hands to the operator, who inserts the needle (holding it horizontally) at a point somewhat in the middle of the tail, and not less than five or six inches from the anus; the needle should be pressed lengthwise under the skin, producing an incision of about one-eighth or one-sixth of an inch in length. After this the operator will give a slight turn to the needle, to allow the lymph to flow from the furrow upon the flesh; and this done, the needle may be removed after slightly pressing the incised skin. In the same manner all the animals of a herd may be operated upon one after the other. It is, however, advisable to have only male sheep vaccinated upon the tail; ewes have to be operated upon in another manner. It has been observed that natural pox, as well as the last-mentioned and so-called tail pox, generally furnishes only a small quantity of lymph; and in such a case the blood or bloody fluid of such pox may be used with the same beneficial effect. It is, however, advisable to select those vaccinated sheep whose pox contains the greatest quantity of lymph. The so-called tail pox, if in proper condition, contains sufficient vaccine-matter for two or three hundred sheep, which matter accumulates upon the edge of such pox, from whence it is to be obtained by cutting off the upper skin. The animal whose matter is to be used must be put in such a position that the other animals are not exposed to the vapors of the former.

Vaccination of the ear.—As in the before-described operation, the animal whose matter is to be used for vaccination must be laid upon a bench at the right hand of the operator, who now himself has to fill the needle with vaccine-matter and to hold the animal to be operated upon at his

left side, the animal to be put in a sitting position. An assistant must be at hand to keep the animal quiet and fast during the operation by grasping the neck of the same with his right hand, and to hold its back straight with his right leg. The operator now seizes with his left hand the right ear of the animal, bending the ear over his fore finger, and keeping the same between his thumb and fore finger in such a position that the inner side of the ear is exposed and ready for vaccination. The skin is now pierced with the needle and the vaccine-matter introduced in the same manner as in the so-called tail vaccination. The animal may also be held in a different manner; the assistant seizing the same by its back and leading the animal with its head between the knees of the operator. In both kinds of vaccination all other proceedings are of the same description. Under all circumstances it is advisable cautiously to introduce the needle under the upper skin and not deeper, otherwise a vehement inflammation or gangrene may ensue and the life of the animal endangered, as has been observed in several cases. It is, however, admitted that such cases are very rare, and we only mention such occurrences as a reasonable precaution.

Process of the vaccinated pox.—On the second day after vaccination the small wound generally disappears, provided the incision or cut is not very deep. On the third day a red point appears, forming a small knot, which is now growing larger and becoming painful. On the sixth or seventh day fever of a more or less vehement, but generally of a gentle nature, ensues. Sometimes it happens that upon other places beside the vaccinated spot pox appears; and in such cases the animal is affected with all the sufferings incident to natural pox of irregular form. On the eighth day the pox is largely extending, until on the tenth or eleventh day it has arrived at its full dimensions, being

then of a scarlet-red color, glossy, very painful, hot, and enclosed by a red circle; its diameter being generally from one inch to an inch and a half. From the eleventh to the thirteenth day the color of the pox fades, the elevation of the pox increasing; at the same time the clear and watery lymph settles around the edge of the pox, so that on the thirteenth day the greatest amount of lymph is formed. After this time the lymph changes into a thick and suppurated slime, the pox shrinks and changes into a dark-brown scurf, which after twenty or thirty days drops off, leaving a scar often of a large size. Such is mostly the case with tail pox, the incidents of ear pox being somewhat different, namely: there is less intensity of redness, the size of the pox being that of a pea, the skin extending and elevating largely, containing a larger amount of lymph, which latter produces so much more vaccine-matter; the natural pox having the appearance of a well-filled bladder or bubble, the scurf being of less thickness and dropping off easily. The entire ear appears to be swollen often to an inch in thickness. There are numerous deviations from the regular progress of vaccinated pox above described; some of these deviations are unimportant; others, however, are more or less critical. It often happens, especially with ear vaccination, that so-called side pox arise in the neighborhood of the vaccinated spot. If such side pox are of a regular form and progress, and not too numerous, there is no danger; there are, however, cases of vaccination in which a general pox disease may arise, which produces the same appearance and danger as the malignant natural pox. But such cases occur very seldom, and are nearly always the consequence of bad management. Another deviation from the regular course of vaccinated pox consists in the difference of time required for the formation and maturity of the pustules, such difference being occasioned by the in-

fluence of the weather and temperature, warmth accelerating the progress, and cold or wet weather causing delay, and even in some cases destroying the effect of vaccination more or less. Vaccinated pox, which matures and suppurates in an extraordinary short time, say in from four to six days, is generally without protective effect, and is therefore called false pox, this being often the consequence of defective vaccine-matter. In some cases a general eruption of red spots upon the skin is observed: such eruption disappears in twenty-four to thirty-six hours, and presents no danger, provided the pox retains its regular form and there is no other incidental disease.

There is no need of any particular precaution or treatment of sheep previous to vaccination; only be careful not to expose such sheep to rain or heat, or to excite the circulation of the blood before operating. It is therefore most proper to keep the herd quiet in the stable before vaccination, or, if such sheep have to be driven a long distance to the operator, to keep the animals quiet for a day after such drive and before operation. It seems further that the most beneficial result is produced by vaccination when the vaccine-matter is not allowed to pass through all the blood-vessels of the body; and therefore it appears again that the ear or tail is the most proper place for vaccination, inasmuch as these parts contain the least number of such vessels.

The treatment of sheep after vaccination is very simple and requires no medical superintendence. On the tenth or eleventh day after vaccination of a herd, each single sheep must be examined to detect those whose vaccination has proved ineffectual, and in such cases the operation should be repeated, the lymph or vaccine-matter to be taken from the pox of some other animal of the herd. In case such second vaccination prove of no effect, the animal may be

regarded as entirely indisposed to the pox disease, and therefore a third vaccination is unnecessary. After the pox has ceased to exist, a thorough cleaning of the stables and all fixtures which have been exposed to the vapors and contact of infected or vaccinated sheep must be undertaken.

In conclusion, it may be remarked that goats which have been in contact with sheep diseased of pox may also take the same disease with like effect. Vaccination may in such cases also be resorted to, although under greater difficulties; and if such lymph is transferred back from vaccinated goats to sheep, the benefit is the same.

VERTIGO OR STAGGERS IN SHEEP.

The devastations caused by this disease are generally known, the yearly average loss being calculated at from five to six per cent., and there are certain instances on record where the loss amounted to fifty, sixty and seventy per cent. amongst the young breed in certain countries, especially in Germany. This disease being nearly always found amongst all herds, it may be regarded as producing the greatest comparative loss of all diseases. Young sheep or lambs, especially those of the age of from five to eight months, are most frequently attacked with vertigo.

The following are the incidents of vertigo in its perfect state: The diseased lamb is more or less deprived of its senses and of the functions of the organs of motion; the animal is weak and its motions difficult; it staggers and reels, and prefers to lie down, and once down, it remains in a state of stupefaction, there being very little or no appetite. The gait or walking of the diseased animal always

describes a circle, of larger or smaller dimensions according to the progress and state of the disease (a straight gait being a very seldom occurrence), the animal lifting its feet very high and running against everything. The stupefaction and senseless state increases by degrees, the animal then being unable to seek its food, eating very little, and only when food is forced into its mouth; and even in such a case the chewing is often interrupted, as if the animal forgets eating such food. Finally, the lamb ceases eating entirely, being unable to stand, laying its head sideways, and remaining in a perfect stupor and without motion until death occurs sooner or later—often in a few weeks after the beginning of the disease. When the disease has arrived at an advanced degree, a soft place may be detected upon the skull by pressing the same with the thumbs of both hands. Here the so-called worm-bladder has its location; this worm-bladder presses the skull-bone, reduces its thickness, and produces the very incidents of the disease, according to the size, position and extent of such bladder. The movements of the sheep are directed sideways from the direction where such bladder is situated, except when the bladder is located upon the back part of the brain; in such case the animal moves with nose erect in a nearly straight line; and if the bladder is located upon the lower part of the brain, the animal droops its head as low as possible. When such a diseased animal is dissected, one or more of the beforementioned worm-bladders are found in the hollow part of the skull. This bladder consists of a thin, closely-constructed membrane, filled with clear, light, yellowish, watery fluid, in which a large number—often several hundred—of small white corpuscles are observed, which appear to the naked eye like poppy-seed; when such a bladder and its corpuscles are examined by means of a magnifying glass, the latter are found to consist of live animals of an oblong,

wrinkled form, the head being provided with four suckers and a double row of hooks. These animals are so connected with the bladder that the latter appear to be the general body of the former, and the animals themselves extending their heads and necks upon the base of the bladder, and attaching their sucking apparatus to the brain of the animal, by which means the sap of the brain is absorbed to such an extent that the brain of a dissected animal is often found to be hardened yellow matter. When the bladder is situated upon the surface of the skin, it is to be found under the skull-bone and under the hard skin covering the brain; the growth of the bladder causes a pressure of the bone, by which means the bone becomes softened and thinned, sometimes to such a degree that the bladder is only covered with a skin, whereby the diseased spots may be easily detected. Mostly, however, the bladder is found in the brain, and seldom in other parts. Sometimes a large number of worm-bladders may be found upon the same animal. In the beginning of small size, the bladder increases considerably, sometimes to the size of a hen's egg, and even larger. There is no doubt that the worm-bladder is the immediate cause of vertigo, as a consequence of the pressure of a foreign body upon a most tender organ of the body. The cause of the formation of the bladder is, however, still unknown. One of the most celebrated and experienced practitioners has published an essay containing very valuable observations in regard to the formation and origin of said disease, from which we give the following:

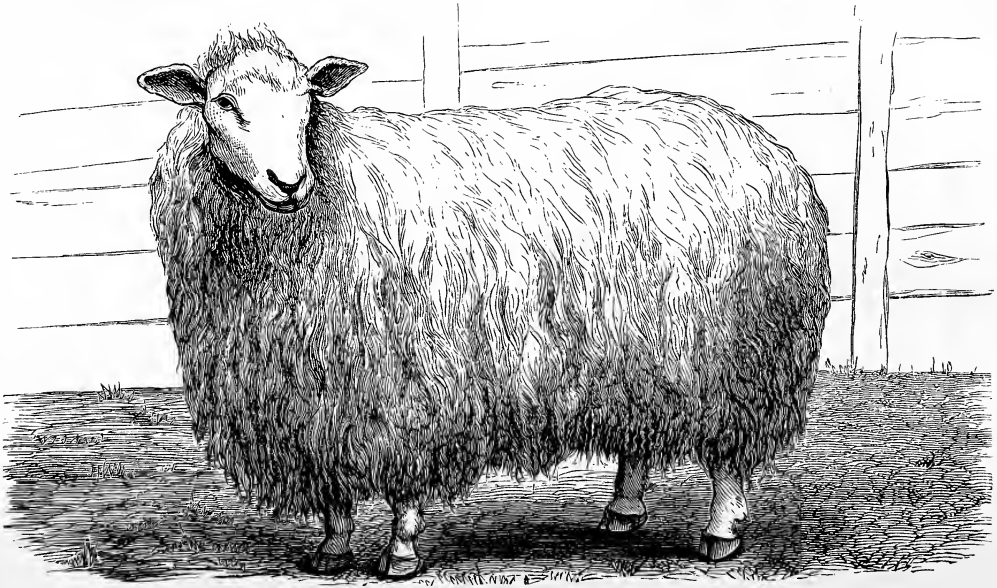
In almost every case an inflammation of the brain precedes the formation of the worm-bladder and the disease of vertigo, the strongest and healthiest lambs being mostly subject to the same. The animal is sullen, without appetite and affected with constipation, the other symptoms being the same as in regular inflammation of the brain; there

may be less fever, but the eyes are very red. This disease in some cases may disappear in two days, and without being at all observed If the inflammation is not too vehement, a cure will take place of its own will and without any artificial assistance, the animal appearing perfectly sound until, after a certain time, many of these animals become afflicted with vertigo. The proper origin of the worm-bladder is as little known as the original formation of the worms found in the abdomen. In one case it was observed that from two hundred lambs which had during the first summer become afflicted with inflammation of the brain, one hundred and sixty were attacked during the following winter by vertigo. Another case is reported in which under similar circumstances two hundred out of four hundred sheep died of vertigo. From the above-mentioned and numerous other circumstances, it is evident that vertigo is mostly if not always caused by a former inflammation of the brain, and therefore it is important to investigate the cause of this latter disease. Such cause consists principally in overfeeding the bearing ewes and lambs during winter, by which means a plethoric condition of the animal is produced, which during a hot temperature may lead to inflammation of the brain. A large number of lambs are often during summer attacked by inflammation of the brain in consequence of a sudden change from meagre to abundant feeding, especially when the herd is allowed to roam and feed upon stubble-grass after having been kept on close diet.

Kuers relates a case in which a herd of four hundred lambs, which had been driven upon an abundant clover stubble-field, were after three days attacked by inflammation of the brain, of which number two hundred died of vertigo during the next winter. Consequently, overfeeding or a sudden change of diet and temperature produces the first cause of inflammation of the brain, and subse-

quently vertigo itself, which may be avoided or prevented by a careful prevention of such injurious causes and influences. It is therefore advisable to keep the lambs during midsummer in cool and airy stables, to feed them with good green fodder, and furnish them from time to time with a lick of saltpetre, glauber salts and rock salt. In case of inflammation of the brain, large portions of salt must be given; the animal must be bled, taking about half a pint of blood; a seton may also be applied upon the neck.

In case of vertigo in its developed state, and when the worm-bladder is fully formed, there is no use in a general or local treatment of the disease, except the emptying of the bladder by means of a mechanical operation. This may be done by an incision with a small trocar or sharp-pointed instrument, when the incised spot must be turned in such a direction that the water may flow from the bladder. Such an operation produces sometimes an effectual cure, but often results in the death of the animal, by producing suppuration of the brain. Sometimes the bladder may be removed through the opening by means of pincers or a pin: if this is impossible, the skin of the bladder may remain upon the brain without any apparent harm. All other kinds of operations are without effect, except perhaps the burning of the bladder by means of a heated iron, which, however, is of no better effect than the before-mentioned operations. Other exterior remedies are without avail, even the application of muriatic acetate of zinc, which was formerly a great favorite with practitioners. In most cases it is advisable to kill the diseased animal before the same is exhausted from sickness, the flesh of such animal being then as good as that of a healthy one.



COTSWOLD SHEEP.

ITCH OR SCAB IN SHEEP.

This is a disease known in all parts of the world from time immemorial, and was formerly much feared on account of its very extensive devastations among sheep. In the present time this fear is removed by the experience and knowledge that the disease can be cured in nearly every instance.

The detection of this disease is not difficult. If upon examination of the fleece places are found where the wool rises above the surface of the fleece, and if the sheep repeatedly gnaws at such spots or rubs the same against other objects, it may be taken for granted that itch is prevalent. Upon examination of such diseased spots the skin is found to be discolored, of a greenish-yellow, and sometimes a little reddened; the skin is thickened and covered with a clear moisture. When the skin of such a part is squeezed, the animal will show signs of pain, and upon scratching the spot with the finger the sheep appears to be comforted. The wool upon and near such diseased spot drops off or can be easily removed. In some cases small knots or bubbles of the size of millet-seed may be found upon or near these spots, which contain a clear, adhesive fluid, which latter partly moistens the skin and partly dries in the form of a thin scab, enlarging and extending and adhering strongly to the skin. The skin under the scab is hard, pale, thick and uneven, cracked and rough. The animal is afflicted with vehement itching, and constantly tries to rub the diseased parts by all means. This rubbing causes the wool, which is full of moisture, to become a felty mass, and at last to drop off. The scab or itch generally appears upon the back, on the side of the shoulders and belly and upon the buttocks. The head, legs, genitals and the lower part

of the belly are very seldom afflicted with itch, and then only in a very advanced stage of the disease. The itch always begins upon a small spot, and extends from time to time until the entire surface of the body is affected and the wool removed therefrom; such a general spreading of the disease advances very slowly, and often requires from four to eight months. In hot stables and during summer-time the disease spreads in a short time; in cold weather the progress is very slow. Although the disease in itself is not of a dangerous nature, death will surely result from its long continuance. The animal grows lean, notwithstanding a good appetite; the skin is entirely deprived of wool, covered with a discolored, nauseous and suppurated moisture and overloaded with a thick scab. Dropsy, pulmonary disease, lingering fever, etc., ensue, which finally result in death; when the animal has been well fed during the disease, the last-mentioned consequences may take place after one or two years.

There are two causes of this disease: it may originate in itself or from infection. The first cause is said to be a consequence of constant exposure to wet or rain, especially in summer, of want of good feeding, and of different morbid conditions of the animal. In most cases, however, infection forms the first cause of the disease. When the diseased skin of a scabby animal is examined, either with the naked eye or by means of a magnifying glass, numerous small insects, the so-called scab-mites (very similar to the scab-mites of the horse) may be detected. The transfer of each mite from scabby to healthy sheep forms the only and exclusive cause of infection, after which the disease is regularly formed in a period of from ten to sixteen days, there being no indication of infection before the seventh day; on the seventh or eighth day the mite itself may be detected upon the skin of the infected animal; from the ninth to

the twelfth day several small spots of a yellowish-red color, and also a certain thickening of the skin, become perceptible, after which a greater or smaller number of knots or bubbles are formed, containing the above-mentioned moisture and producing the scab. After this time the disease takes its regular course. Infection follows sooner or later, according to circumstances. When a scabby sheep is left among a healthy herd for twelve to twenty-four hours, several of these healthy animals will be most surely infected, which infection or transfer of the mites is done either by immediate contact of the healthy with the diseased animal or with other immediate objects, as, for instance, when a diseased animal rubs against a fence-post, and shortly afterward a healthy animal, by rubbing against the same post, thereby receives the mites dropped or left by the diseased animal upon the post, such mites retaining their vital and infective power for two or three weeks, except in a very cold temperature. The disease spreads with great rapidity, especially in warm, wet and sultry weather, and when sheep are kept closely together in stables. Cold and wintry weather, large, free and extensive pastures, cause a considerable delay of the disease. It always requires several months before the larger part of the herd become infected. The further propagation of itch upon the single animal is generally, if not always, caused by the increase of mites, which penetrate and deposit their eggs under the upper skin, by which means other generations of mites are produced in a very short period. During warm weather, and especially during sunshine, the mites may be found in innumerable quantities upon the skin; during cold weather and rain they retire into their abode in the canals under the skin. In some cases sheep itch may be transferred to man, producing a similar scab, but not of such dangerous consequences as genuine human itch: such

cases are, however, of very rare occurrence. It is further stated that this disease may be also transferred to other domestic animals, as, for instance, the dogs of the shepherd, but this statement is not sufficiently corroborated. The skin is sometimes in certain conditions where the prevalence of itch may be suspected, but where it does not exist, as in cases where the fleece is uneven or losing parts of its wool. A close examination of such spots will remove all doubt, the healthy skin being of a natural color and appearance, soft, elastic and free from moisture, and the animal shows no signs of uneasiness or itching. Such falling out of wool happens often in spring or in the beginning of summer, and is generally found in weak animals. This disease (itch) must also not be confounded with mouth scab, which only affects the lips or face of young sheep, whereas itch never affects the face, and befalls old and young. Sometimes the sheep scratches and gnaws in consequence of lice, which may be easily detected upon examination. Upon some spots between the wool and skin a great amount of fatty moisture or sweat is often found, which must not be confounded with the moisture of itch. In case of doubt the wool must be clipped off from such places and the skin examined. Sometimes sheep are afflicted with a tetter-like eruption; this eruption affects, however, only small parts, entirely loosening the wool in a very short time, and causing very little or no itching. Nobody who has had any experience will confound the pox with itch, and it is therefore only necessary to observe the following: Pox, unlike itch, is mostly found upon the bare parts of the skin, between the legs and upon the face, and commences with fever, taking its regular course, there being no itching and scarcely any similarity to itch disease. When there is a vehement itching, a formation of scurf and an eruption, followed with loosening of wool, it may be

taken for granted that itch disease is prevalent, and all further doubts are removed by the appearance of mites upon the diseased skin; it must, however, be stated that itch disease may prevail without any mites being observed. Like the itch of all domestic animals, this disease presents no danger to sheep; it is not, as formerly generally believed, the result of a particular acrid or corrupt condition of the humors, being nothing else than a local disease of the skin, which may become dangerous and deadly only in consequence of long duration or accidentally. Notwithstanding this, the disease is of a very disagreeable and obnoxious character if it is permitted to affect a large part of the herd. Its cure is a matter of some difficulty, and the disease costs a large amount of fodder and trouble, loss of wool and a partial destruction of the fleece, which latter is caused by the application of remedies. When the animal is at the same time afflicted with other diseases, or emaciated in consequence of eruptions, the result of the cure may become doubtful, and depends upon the general constitution of the animal. There is, however, no doubt that sheep itch may be effectually cured during all times of the life of the animal in case of prompt attention. There is no prevention of the disease (in the general application of said word) either by medical or other means, and all so-called preventive remedies consist in a proper attention to and diet of the animals, or in their separation from others affected with itch. The cure only requires a local treatment and external remedies. In case the affected sheep is emaciated and weak, a lick composed of sulphur, juniper-berries, calamus-root, tar, turpentine and bran may be given in suitable portions with good results; and in case of rot or other diseases, other remedies suitable for the same may be also applied. The cure of itch is either palliative or radical. In a case where only a few animals of a herd are

afflicted with itch, the further spreading may be sometimes prevented by separating the diseased animals from the healthy in such a manner that such separation is to be repeated for weeks, as long as any infected animals are found. Such a remedy is, however, seldom of avail, inasmuch as a considerable part of the herd may be affected without any possible detection. This palliative cure, being still in some cases of benefit, may therefore be recommended. Of undoubted success, and therefore in nearly in all cases advisable, is the radical or simultaneous treatment of the whole herd. Formerly such a cure was seldom attended with favorable results, notwithstanding the employment of a great many different remedies. At the present time, however, the best results have been obtained, and itch disease may in most cases be considered as of little importance. Its cure may be warranted, provided the animal is not at the same time affected with another disease. The remedies of former times consist mostly of ointments composed of sulphur, turpentine, tar, quicksilver, etc. Although such remedies may be suitable in their proper form, their employment as ointments is not to be recommended, the cure being troublesome, expensive and tedious, it being almost impossible to apply such ointment to every diseased spot under the close-grown wool, which is of the greatest importance. For this reason ointments may be applied for months without entirely abating the disease. At the present time it is generally understood that the proper cure of itch consists in washing and bathing the affected animals, by which means the entire skin is supplied with the proper remedy without searching for the diseased spots. The composition of such washes or baths differs according to the opinion of the practitioner, the most celebrated composition being that of Surgeon Walz, which, however, I have repeatedly tried without any satisfactory result, it being too

weak and not in all cases efficient. The best wash or bath that I have applied during twenty years with the most satisfactory results consists of the following: Six pounds of burnt, unslacked lime must be slacked by sprinkling water upon it in a proper vessel, to which six pounds of potash and ten quarts of water are to be added: this mixture must be boiled and well stirred for about an hour. When this lye has been boiled sufficiently, eight pounds of pine oil and two quarts of tar must be added and well stirred into the same. In another and larger vessel twenty pounds of tobacco-leaves must be boiled in one hundred and thirty quarts of water for two or three hours, after which this decoction is to be thrown into a large tub (the tobacco-leaves are thrown away as worthless). To this decoction the above-described lye is to be added, and both must be well stirred and mixed together. The remedy is then ready, the quantity being sufficient for one hundred sheep. It must be applied in the following manner: The sheep must be laid sideways upon a board of sufficient size, one assistant holding all four legs of the animal, another assistant pressing its head down and parting the wool lengthwise from the ear to the upper part of the hind leg, the parting line remaining about three or four inches distant along the middle of the back. Another assistant applies the lye or wash (which must be of a temperature of about 110° or 120° Fahrenheit, or warm enough to suffer the hand to touch the same) by means of a sponge or bottle along the parting line, so that the fluid will flow into the separated fleece. The animal must then be turned over and the lye applied in the same manner upon the other side. After this the animal must be put upon its feet, the wool parted straight along the middle of the back, beginning at the neck and ending at the tail. A quart of lye is sufficient for each unshorn sheep. The part of the skin covered with

scurf is to be cleaned by means of a dull knife or by the finger nails, and separately supplied with said lye. As the wash or bath adheres to the skin in a uniform manner, there is no necessity of further rubbing the same into the fleece. In case the disease is of an obstinate character, the remedy must be applied again in the same manner in about eight or ten days, whereby a greater security against further damage is obtained. Such a treatment requires very little time; from five hundred to six hundred animals can be washed in one of the shortest winter days. The lye should be kept sufficiently warm during the operation. This lye recommends itself not only by its efficiency, but also by its cheapness, the outlay being very small in comparison with the value of its benefits.

Finally, a very important matter has to be stated—that is, the prevention of a new infection of the herd. Such a re-infection has to be guarded against with the utmost care, it being a well-known fact that the best remedies may become unavailable if such proper care is not taken. It is therefore advisable to keep the infected animals in their usual place until a repeated application of the remedy has been followed by a thorough cure of the herd. After the effectual application of the last bath, the animal must be taken to another locality, to allow of the disinfection of the original place, which is to be done by the removal of the dung and by whitewashing the stable and all its fixtures with a mixture of lime-water and chloride of lime (mixing one pound of chloride of lime with a pailful of lime-water). The cured animals must always be kept separate from the infected animals.

INFLAMMATION OF THE LUNGS.

This disease is in most cases caused by colds, which may happen to the animals in different ways, especially shortly after shearing during rainy and cold weather, also when the animals are suddenly exposed to a cold shower during hot weather and after being driven a long distance. Sometimes inflammation of the lungs is the consequence of a vehement catarrh or influenza, whereby in the beginning a discharge from the nose and eyes may be observed. When pox is of a virulent form or improperly treated, the lungs may also become inflamed, showing the incidents of the so-called pulmonary disease. (The article on "Pox" contains a full description of these incidents.) After death, water is often found in the cavity of the breast, or the lungs appear of a very dark color, very hard and filled with knots. Exudations of fibrous matter upon the surface of the lungs or upon the pleura occur very seldom. The cure must not be delayed or death will follow in a short time. The diseased animals must be bled, taking from a quarter to a half pound of blood, according to the age of the animal. At the same time a solution composed of saltpetre (from one half to one drachm), glauber salts (one ounce), or, instead of this, one ounce of tartar, mixed with half a pint of water, must be administrated with great care until the animal is relieved of soft dung. In case the animal is of great value, and its recovery very desirable, the sides of the breast must be rubbed with an irritant mixture composed of aqua-ammonia, oil of olive, cantharides and tincture of opium, taking one-half ounce of each. Before applying this remedy it is necessary to remove the wool from the proper place to the extent of about five or six inches in diameter. In case a frequent cough or discharge from the nose is observed, or when the disease originates from a very vehement

influenza, the bleeding of the animal is unnecessary, and instead of the above-mentioned infusion the following infusion may be given: sal-ammoniac, one ounce; tartar emetic, one drachm; fennel-seed and juniper-berries, two ounces each—to be mixed with honey and water, and the mixture to be given from four to six times a day, the whole quantity being sufficient for two days. Instead of the application of the above-mentioned irritant, a fontanel may be also applied in such case. In case the inflammation of the lungs is caused by pox, there is scarcely any remedy that can be successfully applied. During the treatment the animal must be kept in the stable, the food consisting of green fodder and the drink of clear water, which may be mixed with flour or linseed-cake, as much as the animal may take.

MALIGNANT FOOT ROT.

The malignant foot rot, distemper, Spanish foot rot, or French distemper, was unknown in Germany until the year 1816 or 1817, and seems to have been introduced with the importation of noble merino herds from France. Several of these herds, especially in Saxony and Prussia, which were affected with the epidemic soon after their arrival or even during their transportation, were lost entirely; for at that time nothing was known about the nature, contagion or cure of the disease. Fortunately this state of affairs, as will soon be evident, has changed.

At the breaking out of the disease, single sheep were carefully observed from the beginning, and the following phenomena occurred: generally only one foot is attacked at first, or only one claw, and the disease spreads, according

to circumstances, over the whole foot, and sometimes, though rarely, over all four.

A few days after infection the naked skin in the cleft of the hoof appears somewhat redder and warmer than in its normal condition. On the inner side of the affected claw, where the upper edge of the horny shoe unites with the skin of the fleshy crown at the balls, forming the so-called seam or suture of the hoof, an aqueous, badly-smelling liquid exudes, and the skin separates at the suture. If the affected claw is pressed with the hand at the ball, the sheep shows by a convulsive jerk with the foot that it suffers pain. The ball at the diseased side is somewhat swollen and hot, and the animal is but little lame during the first six or eight days.

As the disease advances, the inner horny wall separates more and more from the hoof-bone, and the secretion, which was clear before, now becomes more copious, thicker and dark. It flows downward behind the horny wall toward the sole of the hoof, and destroys all connection of the inner side of the horny capsule with the foot, so that the former falls off.

The secretion is very corrosive, and attacks not unfrequently the ligaments, tendons and even the bones, especially the hoof-bone, which it destroys to a greater or less extent. It is frequently mixed with blood, flocules of mortified cellular tissue, etc., and always smells badly. While these changes occur within, the external surface of the horny capsule becomes friable, cracked, very long and misshapen, and is covered with rings and knots. The toe turns upward, and the outer wall is folded inward and under the sole.

After the capsule has fallen off, a new one is formed, and this is repeated several times, but the new claw is always more or less deformed and crippled.

The cleft is opened more widely than usual, the foot is swollen and the claws stand further apart, so that the diseased animal can be recognized by its larger footprints in the snow or in soft ground.

At first the sheep is but little lame, but if the separation of the horny shoe and the downward tendency of the secretion have advanced, considerable lameness becomes evident, and the animal suffers much pain. It steps but little on the lame foot, and if both fore feet are affected, it slides along on its knees while eating, and lies down almost constantly during the rest of the time. This condition may last several months, and the animal nevertheless may appear healthy, eat, chew the cud and be in good spirits. There is no fever, and the sheep loses no flesh while remaining in the stable, if it receives good food. Finally, however,—especially if both feet be attacked,—the animal loses flesh on account of the exceedingly great pain, ceases to chew the cud, the appetite diminishes, an insidious fever sets in, and after half a year or a year, when the animal has wasted down to a mere skeleton, it dies from suffering and exhaustion.

The preceding is a picture of the disease in single animals. Its course as an epidemic or plague among a flock will be described directly.

Foot rot is very highly contagious, as has been determined with certainty by numerous observations and experiments, made by inoculating the secretion. The disease appears to be peculiar to the Spanish merinos, which are exported to other countries. It seems to have been introduced into the United States a number of years ago by Spanish merinos, when I had an opportunity to apply my treatment with good success. It has not been ascertained whether the cause of the malady lies in the transportation of the herds to distant parts or in the change of climate.

It is strange that in Spain, the native country of the merino, the epidemic does not occur—a circumstance which cannot easily be explained by the difference of the climate. Many, and among them high authorities, incline to the opinion that the origin of the disease is not to be sought in foreign sheep of noble race, but that the true malignant epidemic may arise spontaneously and spread by contagion. This point, however, still remains in doubt among practitioners.

Foot rot is most frequent in merinos, less so in half-breed, and least in common country sheep. Nevertheless, the latter do not enjoy entire immunity from it, as observation has shown; and the same holds true of the lambs of all races. The more common kinds are less liable, because their wool, skin and hoofs are of coarser texture, while the more delicate build of the merino is not so well fitted to resist the disease.

If the disease break out in a flock, only a few sheep (or perhaps only a single one) may be attacked at first, and these impart it to the rest. Generally but one claw is attacked at first, and the disease then spreads to the next on account of its close proximity.

After breaking out, the epidemic spreads under all circumstances, in every season and weather, and cannot be prevented by the greatest care and attention until the greater part of the flock have fallen a prey to it, unless a separation or a cure is effected.

Its progress is always so slow that in large flocks years may elapse before all the sheep are infected. The contagion is facilitated by wet summers or other causes which tend to soften the claws, as heat and moisture combined, or when the sheep stand closely together on warm dung in a stable. Cold and turning out to pasture during dry weather retard the progress of the epidemic.

Formerly very erroneous views prevailed concerning the causes and true seat of the foot rot, and it was reserved for the present time to shed more light on the subject. Some believed a worm to be the cause, which took up its abode in the bag or gland of the hoof. This error was caused in the following way: In the upper, anterior portion of the cleft there is an orifice leading to a tube closed at one end, which is formed by a convolution of the external skin. The inner surface is without hair and is covered with glands, secreting a tallow-like substance, which collects there in masses. If this tube or bag is pressed with the fingers, the above substance is squeezed out, and naturally assumes a curved shape, which was erroneously considered as a worm and as the cause of the epidemic. It is true that the bag may become inflamed, and produce a malady of the hoof, but it will never cause the malignant distemper of the foot. The inflammation of the cleft, which sometimes occurs, must not be confounded with the epidemic, because it is not contagious and does not attack the horny capsule. In order to avoid mistakes, the breeder should distinguish between the mild and the malignant forms. For this reason I will enumerate the essential symptoms:

Malignant Foot Rot.—1. At first, secretion of an acrid, very offensive liquid over the inner suture, without much swelling.

2. Formation of a briny liquid in the hoof; the hoof becomes deformed and falls off; the tendons, ligaments and bones are attacked.

3. Lameness after ten or fourteen days, when the sheep will slide along on its knees and belly.

4. There is no fever; the disease is very slow, attacks at first only one claw, then spreading over several, and continuing for months.

5. It is always caused by contagion, spreads very slowly

in a flock, never disappears spontaneously, and may attack the same sheep several times.

6. The spreading of the disease may be prevented by strict separation. It is only accidentally that more than one animal is attacked at the same time.

7. Its seat is solely in the capsule of the claw.

THE MILD FORM.—1. At first considerable inflammation, heat and swelling around the crown of the hoof. Blisters are formed, containing a clear liquid, which is neither acrid nor offensive.

2. It never or very rarely attacks the inner parts of the hoof, or causes it to fall off.

3. Lameness is caused as soon as the disease breaks out, and is but slight.

4. Fever is present, and the malady terminates in twelve or eighteen days. It generally attacks several claws at once, and does not spread afterward.

5. It is caused by unknown or general influences of the weather, attacks a whole flock in a very short time, disappears spontaneously or after applying simple remedies, and does not attack the same sheep more that once.

6. It cannot be prevented, because the cause lies in the atmosphere. Cattle and hogs suffer at the same time, and it spreads simultaneously over whole districts.

7. It affects only the parts above the capsule of the hoof, and rarely ever, or only accidentally, attacks the latter.

The question, Is foot rot a dangerous disease? cannot be directly answered, because everything depends on circumstances, and especially on the treatment. Experience has more than sufficiently proved that it may become destructive, since whole flocks have fallen prey to its ravages. Again, the malady may be said to be entirely without danger, because its spread may be prevented by separating the

sick animals from the flock, and even these can be cured radically, surely and easily. I know of a case where five large flocks were attacked simultaneously, and where the epidemic was present for two years. Although all proper remedies were tried, the disease would not yield, because a careful separation of the sick animals was not effected. Some sheep lost much flesh and wool, and the disease seemed to be of a dangerous character. I was summoned to cure it, and it disappeared in five or six weeks, which I do not consider a great achievement. The disease rarely, if ever, disappears spontaneously, but it will nearly always yield to a proper treatment, and by this the danger or want of danger may be judged.

Let us now consider the cure of the disease. If the foot rot has broken out among a flock of sheep, it is of the utmost importance to separate the healthy sheep from the sick, in order to prevent as much as possible the spread of the disease. All sheep which are lame, and in which the disease is unmistakably present, should be removed.

Experience has made us acquainted with a large number of remedies, by means of which foot rot may be cured. The reputation which any one of them may have acquired above the others seems to be based more on the manner of its application than on its superior curative properties. The medicine is of secondary importance, the chief point being the surgical, manual operation. It must nevertheless be remarked that all remedies are not of equal value. Foot rot has often been cured by the application of different acids and caustics; as, for example, nitric acid (aquafortis), sulphuric acid (oil of vitriol), pyroligneous acid (wood-vinegar), butter of antimony, burnt alum, lunar caustic, vitriol, hartshorn oil, etc.; but the most of these remedies cannot be recommended, because they needlessly increase the inflammation which may be present, and

thereby the pain, retard the cure, and are expensive and difficult to apply.

The only aim of the treatment being to lay bare the diseased, suppurating surfaces, and to destroy the infectious matter on them, the remedy which accomplishes this with the least possible disagreeable secondary effects is evidently the best.

For this purpose chloride of lime (bleaching salt) is without exception the best, because it destroys the infectious matter of the foot rot, like all other animal contagions, in a wonderfully rapid and certain manner. The latest experience in the use of chloride of lime places it at the head of all remedies against the disease. I myself cured nine large flocks in different places so rapidly and easily by its use that I was surprised, as no other remedy had before afforded me such good results.

Günther, the vice-director of the Hanover School for Veterinary Science, has made known an excellent way of curing a flock suffering from foot rot by means of chloride of lime, and I will describe the essential points of his method here:

After removing all the sick sheep from the flock, it is possible and even probable that some of the remaining ones are already infected, although they do not show the disease, and that some of the virus adheres to their hoofs. This virus is destroyed by chloride of lime in the following way: A crib or long trough is filled to the height of six inches with cold water, into which one pound of chloride of lime is poured for every pail of water. A hurdle is then made of the crib by fencing in the sides, and the suspected sheep are forced to go through the water in it, which can easily be done. The virus which may cling to the hoofs, and which has not yet had time to act, is destroyed in this way. If the hoofs of the sheep are very dirty, they should first

be driven through water or dry straw. They are then turned out to pasture, which must be as dry as possible, rich in grass and not too distant. They should have a separate shepherd, who does not come in contact with the sick animals. If possible they should be kept in the open air, far enough away from the others. The flock should be inspected every third day, and if a sick sheep is found it should be immediately put with the other patients. If the sheep must be kept in the stable, as in winter or in bad weather, an inspection should also take place every three days, and new patients removed. The chaff, etc., on the stable floor should also be renewed. If the trouble is not considered too great, the above foot-bath may be repeated every week if there are new cases of the disease.

The sick sheep are treated as follows: It is important to remove immediately all separated and loose horn with a narrow, sharp knife; for it is evident that the remedy, which is to destroy the virus and cure the disease, cannot act as long as the suppurating surfaces are covered. This cutting is therefore the principal thing, and the success of the treatment depends on the complete and proper performance of the operation. The bad repute into which some remedies have fallen is due in a great measure to the method of their application. It is almost unimportant of what the remedy consists, and it might be composed simply of vinegar or salt and water.

The operator sits down on a bundle of straw, after an assistant has turned the sheep on its back, and opens the cleft of the hoof. He then begins at the suture and cuts out all horn which has separated from the foot and is suffused with matter. The inner sides of the horny capsule deserve special attention, as do also the parts where the horn appears whiter and softer than on the other parts of the hoof. The knife must be freely used, and all loose horn

removed up to the point where the connection remains unimpaired. The bleeding which may occur is wholly without danger.

A knowledge of the anatomy of the sheep's hoof will prevent the abuse of the knife. It is proper in all cases to pare down the sick hoof considerably at the toe and external wall, because it can then be more easily examined, and it does not touch the ground so forcibly when the animal is walking as when it is larger than the healthy one. The knife must be cleaned from time to time, so that the matter adhering to it does not infect the healthy parts.

If the disease is further advanced, and the secretion has collected far down in the hoof, the same operation is performed; and it will sometimes be necessary to remove the whole capsule. Every hidden channel which may be present should be sounded, opened and laid bare. If the wound becomes covered with blood during the operation, as is commonly the case, it should be frequently dried with tow. If a single diseased place remain from which the horn is not removed, a cure cannot be expected. After cutting away the whole or a part of the horny capsule, it is always necessary to apply a bandage to protect the hoof from dangerous external irritation. After applying chloride of lime to the surfaces as above, the cleft is filled with tow whose ends are twisted into a small cord and fastened around the pastern-joint. This forms a soft and tightly-fitting bandage.

The diseased hoofs are inspected daily, covered with chloride of lime, and bandaged anew if necessary. If a diseased spot is discovered which escaped notice before, the knife must be applied, and not unfrequently a portion of the newly-formed horn again removed. Generally two or three applications are sufficient for a cure. The pain and

lameness disappear very soon, and diminish even after the first few days. The surface of the wound becomes dry and is covered with a thin skin, which becomes whiter, thicker and more compact every day, and forms the new horn. The disagreeable smell disappears almost immediately after the application of the chloride of lime. If this is not the case, if the sheep is very lame and the surface of the wound moist, it may be taken for granted that there is a hollow sore in the capsule which before escaped notice. This must be found and cut.

If sinews, ligaments and bones are attacked, everything that is corroded must be removed with the knife. Chloride of lime is then applied for two consecutive days, and the wound bandaged with tow. Afterward the surfaces of the wound and all the diseased parts are moistened with a mixture of one part creosote and four parts alcohol. A bandage of tow is then applied, and kept on until an improvement is visible. If the joint is attacked, the lower end of the hoof (generally the hoof-bone) is amputated, and creosote, etc., then applied. The operation requires skill, but is without disadvantage, because the sheep can walk almost as well on one hoof as on two.

Since foot rot is a purely local disease, a general treatment and internal remedies are wholly useless and should be dispensed with. Good and copious food, and perhaps from time to time salt-licks mixed with wormwood, oil of turpentine, tar, etc., are recommended.

If the disease is to be rapidly and thoroughly cured, it is very important to avoid all chances of a new infection. The dung of an infected stable, the pieces of horn removed from diseased hoofs by cutting, old bandages, etc., should be carefully removed or burnt up.

If a dry, rich pasture-ground is near, the patients may be taken there. It is, however, better and more convenient

to keep them in the stable. If no other but the infected one is at hand, it must be previously cleaned very carefully. The dung should be removed and buried, or ploughed down deeply. Cribs, mangers, stands, etc., are covered with whitewash containing one pound of chloride of lime for every pail. It is well to have a different keeper for the sick animals, to prevent infection of the healthy ones from the virus, which might adhere to his shoes.

When the lameness has disappeared, when new and tolerably firm horn has formed on the wound, and when the latter is dry and firmly united with the flesh, the sheep is removed from the sick flock. Since, however, it is not yet safe to return it to the healthy ones, it should be considered convalescent, and separated for at least two or three weeks from both the sick and the healthy flocks. It must be frequently examined, and finally made to walk through chloride of lime water in the way described, before returning it to the healthy sheep. When the epidemic has disappeared entirely from the flock, the stables, etc., should be thoroughly cleansed.

No preventive is known, because the disease arises solely from contagion. It commences by attacking a few head at first, and spreads gradually and slowly to the rest.

If the epidemic has broken out in the neighborhood, contagion from coming in contact with other flocks should be carefully guarded against. The sheep should be kept as far as possible away from such localities, and all communication among sheep, as well as all contact with the shepherds and dogs, avoided. Infected herds should not be permitted to pass through places where the disease has not appeared. After buying sheep, they should be kept isolated for one or two weeks, and carefully observed. It is recommended to keep a sort of quarantine always, even if the vicinity is free from the epidemic.

THE FLUKE.

The fluke is a disease of long duration, closely related to the rot, and not less destructive. At first it shows no striking symptoms, and can be easily recognized only in its more advanced stages. The eye of the patient is pale and covered with a tough mucus. The animal becomes weaker and weaker, loses flesh and its belly swells up. Pressure in the region of the liver causes pain. The appetite diminishes while the thirst increases, and the animal frequently licks woodwork, whitewashed walls, the ground, etc.

The excrement is discharged in large lumps or balls, and is sometimes pasty and thin. The progress of the disease is almost identical with that of the rot, and the same is true of the dead bodies. Water is effused under the skin in the different cavities of the body, the fat has disappeared entirely, and all parts are pale and flaccid. The most important difference between the fluke and the rot is the condition of the liver, which in fluke is very friable, bloated and twice as heavy as in the healthy state. On the surface it is of a pale bluish or lead color and covered with knots or water-blisters. The gall-bladder mostly contains an excessively large quantity of bile. In the gall-bladder and the biliary ducts are found large numbers of flat, oval worms, which are generally four or five lines broad and an inch long.

Fluke is generally even slower than rot, and the life of the patients may be prolonged for several years if the treatment be good. Nothing certain is yet known concerning the cause of fluke. It appears most frequently, like rot, in wet years, after poor food, etc. The worms are formed spontaneously, like all other worms of the viscera; and the opinion that they are introduced into the body with the food, drink, etc., must be considered as erroneous.

The prevention and treatment are exactly as in rot, but the cure is more rarely effected, because the worms cannot be driven out of the liver. In the incipient stages of the disease, however, a cure sometimes succeeds; or, in other words, it may be brought to a standstill. This is all that is necessary, since a few worms are not injurious. In the livers of the most healthy sheep a few worms are frequently found.

The same remedies as for rot may be employed. Wormwood four parts, calamus-root four parts, shining soot from the stove two parts, charred bones one part, and a sufficient quantity of turpentine or hartshorn oil, are mixed, and of this one ounce is given two or three times a week as a lick, mixed with salt and bran.

As a drink, lime-water, or water containing one ounce of green vitriol (sulphate of iron) to the pail, is given.

If the disease be considerably advanced, the sheep should be sent to the butcher before it loses its flesh and value. No such animals should be used for breeding.

GNAW DISEASE (*Hydrocephalus hydatidesis*).

This disease appears most frequently in the second year, rarely before the sheep is one and a half years old, and still more rarely after it has passed the third year. Its seat is nearly always in the spinal marrow, especially in the croup and loin regions. It manifests itself at first by very trifling symptoms, which are easily overlooked. The animal shows a slight weakness in the hind quarters, especially in the root of the tail, and begins to gnaw at its own hind thighs, giving rise to the name, "the gnaw disease." The weakness increases gradually, and with it the

irritation of the skin; the animal takes broader and shorter steps with its hind feet, is unable to jump over elevated objects or walk easily over high steps, and breaks down in the croup if it attempts to jump, so that it will tumble with its fore feet, and even fall to the ground. The same takes place if the sheep is raised from the ground and allowed to drop, and it generally wags its head to and fro. The malady augments from week to week, and with it the weakness of the hind quarters, which becomes very apparent. The animal can no longer gallop, but only trot (hence the name "trotting disease"). If the sheep is forced to run quickly by a dog, it generally falls down, and rises only with difficulty.

During the course of the disease the patient appears stupid, the ears hang down loosely, and the palsy, which at first befell only the hind quarters, becomes more general. During the first few weeks the appetite remains good and the patient does not lose flesh, but afterward it gradually becomes lean, even if the appetite should remain unimpaired, and finally death ensues, frequently after several months.

Most sheep gnaw at their hind quarters, as has been remarked before, but this symptom is not present in every case, and therefore not characteristic. The skin at the parts which are gnawed is deprived of its wool, and if it grow again, it is paler and coarser than before, and loses its curl. Frequently the sick animals bite their skin until it becomes bloody and a scab is formed on the spot, which must not be mistaken for an eruption of the skin or for a cause of the irritation and gnawing.

The disease mostly attacks perfectly healthy, well-fed sheep, and appears more frequently in autumn than in any other season of the year. Noble races are most liable to its ravages, but it has been observed also in very common country sheep. Sheep produced by crossing breeds seem more predisposed to it than others. Death is the common

termination of the disease. It is sure to ensue when the malady is in its advanced stages, but in mild cases recovery sometimes takes place. Many sheep gnaw their skin and appear somewhat lame in the croup; and after this has lasted for several weeks, without other symptoms of disease, it disappears of its own accord. Such favorable cases must always be considered as exceptions to the rule. The duration of the disease, from the first visible symptoms until it terminates in death, is generally from two to three months. Some, however, die earlier, and others, especially if they are well-cared for, much later. On dissection I always found a little water in the cavity of the spinal canal, especially in the region of the last lumbar and first crucial vertebræ. I often found the spinal marrow softer, and in rare cases harder, than in its normal condition, and a portion of it had wasted away. A little water was also generally found in the brain, and the other parts were unchanged and healthy. Sometimes a worm-blister was found in the spinal canal, analogous to that observed in the brain in vertigo, but this must be considered as an exceptional symptom.

The first cause of the disease is not definitely ascertained, but recent observations have shed considerable light on the subject, so that a certain result may be hoped for. It has been discovered that the gnaw disease occurs but rarely in years when the vertigo prevails, and *vice versâ*. This circumstance leads to the conclusion that a certain analogy obtains between these diseases, both as regards their nature and causes. An improper method of feeding seems to have much to do with them, and the predisposition for the gnaw disease is undoubtedly hereditary. A cure of the disease in its advanced stages is rarely ever possible, and it is therefore best to turn such animals over to the butcher. But a prevention is tolerably sure if the following rules be observed:

1. Too rich food in winter, particularly grain, should be avoided, and the diet should be kept as uniform as possible.

2. Too rich pastures in summer should also be avoided.

3. In herds which are kept in a locality favorable to the disease animals below the age of two and a half or three years should not be used for breeding.

4. Rams and ewes belonging to flocks in which the disease prevails should not be bought.

5. The breeding of too delicate races should also be avoided.

The following method is said to have proved very successful in preventing the disease: In September, October and November the ewes which are to be used for breeding are physicked every four days, alternately with glauber salts and ground laurel-leaves. One hundred sheep require two and a half pounds of glauber salts and half a pound of laurel-leaves. In December and January they were made to take these remedies every week, and they are now also given to rams.

INFLAMMATION OF THE BRAIN.

Inflammation of the brain is rare in sheep (except in lambs), on account of the slight energy in the performance of their different functions, and the symptoms are not as violent as in most other domestic animals. The patient eats but little, or nothing at all, lets its head hang down listlessly, and the head, the ears (which hang down loosely) and the interior of the mouth are warmer than usual. The eyes are shining and opened widely, the pulse and respiration are accelerated, and the breath is warmer than in its healthy condition. All visible mucous membranes are bright, red

and dry, the gait of the animal is unsteady, and it easily stumbles and falls. It sometimes bleats repeatedly, but a wild, raving disposition rarely ever appears. The most common termination of the disease is death, which ensues in a short time. The disease (almost exclusively in lambs, however) easily passes into vertigo. The causes are almost the same as in the latter disease. In order to cure the disease the sheep is kept in a cool place and bled immediately, abstracting half a pound of blood. Internally, one-eighth ounce of saltpetre and one-half ounce of glauber salts, dissolved in water, are given four or five times a day. This is continued until an improvement is visible. Cold water is poured on the head of the animal as often as possible, or the head is kept cool and moist by other means. If no improvement is seen after several days, two small setons may be drawn on the crown of the head, and suffered to remain for two weeks, which prevent the termination in vertigo.

DIARRHŒA AND DYSENTERY.

Sometimes a whole flock of grown-up sheep is attacked simultaneously by diarrhœa in consequence of a sudden change from dry to green food, and for this reason the disease prevails most frequently in spring. Like diarrhœa in cattle, it is perfectly harmless. In many other cases, however, it may become dangerous, and even fatal, if it continues for a long time, and especially if any inflammation of the bowels sets in. Only dry food should be given, and a lick composed of wormwood, horse-chestnuts, oak bark, a little pine oil and salt administered from time to time. A drink composed of one-seventh of a quart of an infusion of juniper-berries, with the addition of one ounce of brandy, once a day, is very serviceable.

Diarrhœa is particularly dangerous to sucklings, which perish in great numbers. The disease appears without warning, the lamb becomes languid and sad, keeps away from the other lambs, stands with bent back or lies down frequently. The excrement, which is repeatedly discharged, is thin, whitish or greenish, afterward watery and mixed with mucus, and finally bloody. The animal ceases to suck and eat, but is very thirsty. It bleats frequently, evinces signs of pain if pressure is applied to its belly, and makes efforts to discharge excrement. The lamb rapidly loses flesh, its belly sinks in, and death ensues between the second and fifth days, and sometimes even on the first day. If the body is opened, the runnet-bag especially, and a large portion of the intestines, are found to be inflamed. The runnet-bag and the intestines, particularly the inflamed parts, contain a substance looking like cheese or curdled milk. The best sheep are most liable to the disease, but if it appear as a plague, all lambs without distinction suffer from it.

The causes are colds of all kinds, especially from the influence of rain or moisture and different kinds of food. The stronger and more copious the milk of the ewe is, the easier the lamb is attacked by dysentery, and this mostly takes place a few days after birth. The disease is particularly dangerous in hot stables in winter, when the food is plentiful and the drink cold. The cure is not easy, and the majority of those attacked fall a prey to the disease. It is therefore of special importance to attempt its prevention as much as possible by avoiding all injurious influences, by giving dry food and drinks mixed with flour, and by keeping the sheep in warm places. If the disease makes its appearance in a fold, it is best in all cases to change the food, even if it is apparently proper. The following remedies are serviceable: Opium, ten to twenty

grains, rhubarb, one-eighth ounce, mixed with flour and water or chamomile tea, given in one dose two or three times a day. In some cases one-sixteenth ounce of chalk may be added.

COUGH.

Cough is very common in sheep, even if not caused by or accompanying lung worms, etc., probably because sheep are much exposed to the influences of the weather. The cough which we propose to consider here is of a drawling, metallic character, and is thus distinguished from cough produced by other causes. In spring a large portion of a flock is sometimes troubled simultaneously with cough, and generally no other symptom of sickness is present, except perhaps that the patients do not eat as much and are not as lively as usual. Cold drink, cold and wet weather, etc., are the most common causes of this trifling disease. The cough disappears easily if the causes are removed, and a salt-lick composed of sulphur, juniper-berries and common salt, given occasionally, facilitates the cure.

LUNG WORMS.

This disease (known also under the name "lung worm cough") occurs almost exclusively in lambs during their first year, and very seldom later. Sometimes whole flocks are destroyed by it. At first the sick lambs are weak and lazy, lose their liveliness, do not grow, become delicate and lean, creep along and allow themselves to be caught with-

out resistance. The winking membrane of the eyes, as well as the skin under the wool, is pale, symptoms of catarrh or cold in the head appear, and the patients cough and groan very frequently.

After a time the cough becomes more frequent, labored, sharp and moaning or dull and moist; the animal sneezes and makes efforts to vomit from time to time. The respiration becomes more and more laborious, and causes a visible motion of the flanks and nostrils. Notwithstanding the good appetite which is generally present, the lamb continually loses flesh and becomes weaker, until finally it dies of general debility and exhaustion or of suffocation. The disease is generally very slow, and lasts not unfrequently two or three months, or even longer, before death ensues.

On dissecting the body the principal changes are found in the lungs, which are generally flabby, pale or even white, contain little blood, and show knots and callous elevations at different points. In the windpipe and the bronchial tubes are found much frothy mucus and an immense number of worms, which are often in balls. They are about one or two inches long, not much thicker than sewing thread and of a yellowish-white color. They constitute the species *Strongylus bronchialis.*

Nothing positive is as yet known concerning the causes of the disease. It probably originates from a common cold in the head or from catarrh of the lungs, which causes the formation of the worms in the lungs by its long duration under the influence of other injurious circumstances. To these belong colds of all kinds, the long-continued action of rain or moisture, stormy weather, cold, damp air, etc., as well as poor and sparing food, which causes the animal to lose strength.

The disease is very dangerous and destroys most sheep which it attacks. It is only at first, as long as the animal

retains its vigor, that recovery may be expected; afterward death ensues in most cases.

The prevention of the disease requires proper care and food, and everything which might give rise to the plague or support a cold must be avoided.

The treatment of the disease, when the latter becomes visible, must not be delayed. As soon as the first signs or symptoms, particularly a repeated cough, appear, the animal should receive very rich and nutritious food (even grain), and must be removed from the influence of rain, moisture and cold. To strengthen the digestion and revive the action of the skin and kidneys, a lick composed of wormwood, calamus-root, tar, oil of turpentine, salt and oatgroats, is given every three or four days. A teaspoonful of a mixture of turpentine one part and brandy three parts, poured daily down the throat of the patient, renders good service. All these remedies, however, are of visible avail only as long as the animals remain lively and vigorous, retain their appetite and are not yet troubled with difficult respiration. On the other hand, if the animal has been sick for a long time, is weak and lean, coughs much and suffers from a laborious or accelerated respiration, the disease mostly resists all attempts to cure it, and the worms in the bronchi increase in number and cause an irritation which gives rise to incurable consumption of the lungs.

Very proper attempts have been made to kill the worms in the lungs, in the hope that they would be thrown out by the frequently-recurring cough. This has succeeded in a few cases, but failed much more frequently. The patients are placed in a narrow and if possible hermetically closed box, and are allowed to inhale the vapors arising from heating or burning horn-shavings, wool, feathers, tar, vermilion or chloride of lime. This may be repeated day after day, but owing to the small number of experiments

made hitherto, it has not been determined to what point the air may be mixed with these vapors. It must be ascertained how much the animal can bear without danger. The effect of these fumigations, the best of which is chlorine, is sometimes a violent coughing and expectoration of large lumps of dead worms.

The best and most nutritious food, as well as the above-named remedies, must accompany the fumigation.

Remark.—Calves and hogs not unfrequently suffer from these worms, and I have myself observed numerous cases where very valuable hogs were destroyed by the disease. Their cough mostly commenced while quite young, but their condition remained good for a long time, and they died only after four or six months. During this time the cough constantly increased, the respiration became more laborious and accelerated, and the patient wasted away to a mere skeleton. They nevertheless remained lively for some time, and their appetite was undiminished; but even the richest food was not able to prevent their wasting away, and finally death ensued, accompanied by all the symptoms of pulmonary consumption.

The lungs appear bloated and almost white, especially on their exterior edges. On cutting into these spots a white pus-like mucus oozes out of the bronchi, in which are contained numerous thin worms. All that has been said about the causes, prevention and cure of the disease in lambs applies also to hogs and calves.

ERYSIPELAS.

Erysipelas, or wild fire, appears sometimes in spring among young, and rarely among old sheep. The patients lose their

appetite to a greater or less extent, and have a sad appearance. The thirst increases, as does also the heat of the body. The skin of the head, eyes and mouth is redder than usual and swollen. In a short time little blisters, filled with a clear liquid, make their appearance on different parts of the head. Their skin then bursts and the contained liquid flows out, forming a crust or scab, which dries and falls off. Generally the complaint heals unaided, but sometimes the blisters change to chronic running ulcers, which heal only after several weeks, and may become so malignant as to cause the death of the animals. If wild fire has once been present, it always has a tendency to return.

It almost exclusively selects the nobler races and full-blood sheep for its victims, and appears to be caused by the sudden change of air and light. The opinion of some that it may be produced by poor, vitiated food has not yet been proved. To effect a cure the blisters are cut open with a scissors or a sharp knife, the liquid pressed out, and the skin moistened with a mixture of one ounce of a solution of acetate of lead and two ounces of olive or linseed oil, two or three times a day. If the head be much swollen, one or more woolen strings (setons) may be drawn through the skin over the sub-maxillary glands and allowed to remain for one or two weeks. If ulcers have already formed, they are duly moistened several times with a solution of one ounce of chloride of lime or blue vitriol (sulphate of copper) in a pint of water.

The sheep is kept in the stable during treatment, fed with copious, nutritious food, and receives, if necessary, a salt-lick mixed with sulphur and juniper-berries from time to time.

INFLAMMATION OF THE THROAT.

Inflammation of the throat is rare in sheep, and commonly disappears in a few days. Half a pound of blood is abstracted by bleeding, lukewarm mucilaginous drinks are given, and an embrocation of equal parts of volatile liniment and pine oil applied to the throat after removing the wool.

SORE MOUTH.

Lambs and young pigs are mostly troubled with sore mouths. In lambs small inflamed knots appear around the nose, which are soon covered with a thick, whitish or brownish scab. Sometimes the eruption extends higher up and attacks the edges of the eyelids and ears. The malady is entirely without danger, and it is only when the lips are very sore that the animals are hindered in eating or sucking, and they then lose more or less flesh. The cause of the disease is unknown, but it seems that an abnormal condition of the milk of the ewe has much to do with it. The complaint generally disappears spontaneously, but the cure may be aided by removing the scab with a blunt instrument and moistening the sores with cream or oil. Internal remedies are rarely necessary, but a teaspoonful of magnesia may be administered daily.

In pigs the eyelids are chiefly affected, and often appear glued together and inflamed. In such cases the eyes are moistened and washed with lukewarm milk, and we afterward subdue the inflammation with an eyewash composed of one-sixteenth ounce of eye-stone dissolved in one pint of water. If the pig is otherwise sick and does not eat or suck, it is purged with one-half ounce of glauber salts dis-

solved in water. Both the hog and the young must be put on spare diet, and the stable must be kept dry and warm.

EPILEPSY.

The nature and symptoms of epilepsy in sheep are essentially the same as in most domestic animals. The fit generally lasts from five to fifteen minutes, and the sheep remains for a short time in a kind of stupor after its termination. It then gets up, walks several steps stiffly, shakes itself several times, and is once more in good spirits, has a good appetite, etc. Sometimes several such fits take place a day, which may gradually cause general debility, wasting away and death. More frequently, however, weeks and months elapse before a repetition of the attack, and then the sheep may attain a high age. The causes are the same as in cattle.

As in other domestic animals, little is to be expected of the treatment. If worms in the intestines are the cause, salt-licks composed of tar, oil of turpentine, shining stove-soot, horse-chestnuts, offensive animal oil and common salt are given.

As a rule it is advisable to abandon the cure and turn the animal over to the butcher, since its meat is perfectly healthy and may be eaten without injury.

STAGGERS.

Just before an attack of staggers, the sheep lets its head hang down, stumbles about as if intoxicated, eats little or

nothing, walks behind the rest of the flock, keeps its feet far apart, and finally falls to the ground, where it remains for a short time as in a swoon. It then gets up again, follows the flock and has again the appearance of a healthy sheep. These fits return after a time, sometimes sooner and sometimes later. Staggers much resemble vertigo, and are easily confounded with it, although their causes and true nature are widely different.

The causes of staggers are generally full-bloodedness and a considerable rush of blood to the head. The disease often appears when the animal sheds its teeth, and is seen only in well-fed sheep. Too plentiful food, hot, close air and the continued action of the sun's rays are among the most frequent causes. It is rarely fatal alone, and the patient may keep in good condition for years. It often disappears spontaneously, and rarely passes into inflammation of the brain or apoplexy; in which case it may end in death.

In order to prevent a repetition of the attack, six or eight ounces of blood are removed by bleeding, and this alone sometimes cures the disease. It is occasionally necessary to purge the patient besides, by giving glauber salts two ounces and saltpetre one-eighth ounce, dissolved in water. The food must be of moderate quantity, and the animals should be kept in a cool, shady place. From time to time cold water should be poured over the head of the patient.

HÆMATURIA.

Hæmaturia, or bloody urine, is not of frequent occurrence, but commonly attacks the greater portion of a flock simultaneously. The evacuated urine is of a bloody color,

the sheep is very hot and thirsty, sensitive to pressure in the region of the kidneys, has a stiff walk and suffers pain on urinating. If the causes continue to act, the animal ceases to take food, and colic, pain, fever, inflammation of the kidneys and death ensue. The duration of the disease is generally two or three weeks, but it is rarely dangerous. When no proper treatment is adopted, however, death may be the consequence.

The cause consists in eating injurious plants in spring and winter when food is scarce, so that the animals are forced to browse upon the shoots of trees, especially of pine trees. For this reason many head of sheep suffer at the same time. Cow's-foot, wild rosemary, wolf's-milk and reed-plants cause hæmaturia.

If the disease appears in a flock, hay or straw should be given to the sheep, so that they will not be too hungry when they arrive on the pasture-ground. They should not be allowed to graze in the woods, and should be kept away from hedges, bushes and sour reeds. At first one-eighth ounce of saltpetre and one-half ounce of glauber salts, dissolved in flour and water, and a few days later one-eighth ounce of alum, dissolved in water, or thirty drops of petroleum or pine oil in flour and water, are given.

INFLAMMATION OF THE KIDNEYS.

This comparatively rare disease is attended by an inflammatory fever, a bent position on standing and by frequent attempts to let urine, which is discharged in small quantities and bloody. On applying pressure to the region of the kidneys the patient evinces signs of pain. The animal frequently turns to look at its flank, is restless, paws with its

hind feet and does not take food. Finally all external parts become cool, and a general cold perspiration breaks out, when the animal commences to shake and tremble, and death soon results.

The causes are mostly the same as in hæmaturia. Half a pound of blood abstracted immediately, and one-sixteenth ounce of saltpetre and half an ounce of glauber salts are given every three or four hours. Clysters are injected, and an irritating embrocation is applied to the region of the kidneys after removing the wool. The cure is very seldom successful, because it is generally attempted too late. If the above remedies are applied in time, recovery is certain.

THE ROT.

The rot, or dropsy, is a common disease, which attacks many sheep of a flock, and often does great damage. It is analogous to "fluke," which has been described. A sheep which has been affected with rot can be recognized even at a distance by its languid, lazy walk, its hanging ears, and by the rocking of its head. The animal lags behind the healthy ones, eats but little, is easily caught without offering resistance, and bends its back so as to form a deep hollow when the least pressure is applied. The eyes are pale and without lustre, the winking membrane white and destitute of red veins, and the eyelids bloated. The gums, the lining membrane of the mouth and the external skin are pale. The wool loses its curl, becomes tangled, dull and lustreless, and may be pulled out in large tufts. The digestion is more or less impaired, and diarrhœa is mostly present. As the disease increases, a painless swelling forms gradually on the upper part of the neck near the sub-maxillary glands,

which slowly increases in size. The patient loses flesh and becomes weak and languid, the appetite diminishes, the rumination ceases entirely, and the animal suffers much from thirst. The eyes run with mucus, the gums are spongy, bloated and bleed easily, the belly swells up on account of the water which collects in it. The animal wastes away to a mere skeleton, lies down constantly, has an offensive diarrhœa, and finally dies. The duration of the disease varies. Sometimes it lasts only eight or ten weeks, and sometimes a whole year elapses before death puts an end to the suffering.

In the dead body much water is found under the skin, and generally in the pericardium and in the belly. The blood is pale, thin and watery, and all the viscera, especially the heart, are pale and flabby.

The rot is produced by many causes, some of which, however, have not been as yet sufficiently investigated. It is most common in wet years, and is caused by vitiated food or grazing on marshy, sour meadows. After very wet summers, the rot generally appears late in autumn, continues during winter and spring, and sometimes destroys whole flocks in the following summer. Marshy meadows seem to be much less injurious in spring than in the fall. It may be taken for granted that different injurious influences acting together are required in order to produce the rot.

The cure of rot rarely succeeds, and can only be expected when the disease is not too far advanced. The prevention is therefore of much greater importance. All the above-mentioned injurious influences should be avoided, the animals kept away from low, marshy and moist pasture-grounds, and should receive good, wholesome food, especially hay, etc., when in the stable. Particular care must be exercised in wet years. The sheep should be kept in the stable during rainy and foggy weather, and should

not be turned out to graze too soon. From time to time salt-licks of pine oil, tar, wormwood, calamus-root and juniper-berries should be given. To cure rot when it has once broken out a very careful diet must be observed. Great care must be had to provide good hay, groat-drinks and grain food. The residue of whisky distillation, given in portions of twelve pounds a day, is said to be excellent. The use of medicines is also necessary, and they are most conveniently administered in the form of salt-licks. For one hundred sheep the following mixture is made into a lick and given twice a week: Calamus-root, or wormwood and juniper-berries, each three pounds, common salt one and a half pounds, and a quantity of groats. Or the following: Mustard one pound, and juniper-berries and salt each two pounds, with groats. The use of these remedies must be continued for a considerable time. If the disease is already in its advanced stages, it is well to abandon the cure, since the meat may be eaten without injury.

WIND DROPSY.

Sheep also are not unfrequently sufferers from wind dropsy. The symptoms, causes and degree of danger are like those of wind dropsy in cattle. It is most frequently produced by the excessive eating of young clover and other green food, especially if it is wet from rain or dew, and by grazing on stubble-fields. As long as the distension of the stomach is only on the left side, there is no danger; but if the other side also become distended, death may result. In mild cases the following treatment is adopted: The distended part of the stomach is strongly pressed and kneaded with the hands, which often causes repeated eructations and

removes all danger. The sheep is led by a rope of twisted straw into a pond, or if possible into cold running water, and then kept in moderate motion. If no improvement takes place, a thin tube, provided with a small button of wool or linen, is introduced into the stomach through the mouth, which causes the air to escape in large quantity. Internal remedies are also very beneficial, as, for example, a teaspoonful of burnt lime and water every ten or fifteen minutes, or three-fourths of a pint of soapsuds or lye of ashes, or a teaspoonful of mustard, with brandy, etc. Indeed all the remedies given to cattle against this disease apply here, but only one-third or one-fourth the quantity is given to sheep that would be given to cattle under similar circumstances. If the disease runs very high, the same symptoms appear as in cattle, and death follows not unfrequently from bursting of the stomach. In such cases puncturing the belly is the only remedy, which is performed in essentially the same manner as for cattle. The trochar to be used for sheep is about four inches long and as thick as a medium-sized quill. It is plunged into the most distended part of the belly after removing the wool. When the gases have escaped, the trochar should be removed, because it is injurious to the animal if it remains in too long. The operation easily becomes dangerous in sheep, which are more irritable than cattle. Nevertheless it is often the only means of saving the animal, and should always be performed when there is danger, because it may save the patient in a majority of cases. If no trochar is at hand, a penknife or other narrow cutting instrument may be employed, although with less advantage. After making an incision a thin tube is inserted in the opening. The wound heals of itself, and may if necessary be covered with a little tar.

The operation of cutting the belly has not, to my know-

ledge, been tried in sheep, and is not without considerable danger.

After the gases have escaped, rumination generally returns immediately, and with it the appetite. A scanty and sparing diet at first, and salt-licks, with the addition of bitter remedies, such as wormwood, calamus, etc., or tar, oil of turpentine, etc., complete the cure.

PALSY OF LAMBS.

Lambs become palsied almost exclusively during the first few weeks of their lives; most frequently during the first and second, and rarely after four or six weeks.

The more noble races suffer especially from this complaint, which rarely affects the common races. It generally appears as a plague, and sometimes fifty or eighty per cent. of the flock fall a prey to it. The symptoms are not always the same. The first striking symptom is generally a stiffness of one or more legs; the lamb walks stiffly and with difficulty, stands with bent back and the feet drawn together under the belly. It bends its knees in walking and slides on them. From the parts first affected the stiffness spreads over nearly all the others, especially to the neck, as in cramp. During this time, and a little before the stiffness appears, the animal is more or less sick, listless and sad, is unwilling to change its position, allows its head and ears to droop, etc. Complete constipation follows or a little hard excrement passes with difficulty, and alternates sometimes with diarrhœa. The patient then becomes very lean and the belly is exceedingly thin and tucked up.

During the progress of the disease the stiffness and debility constantly increase, and prevent the lamb from

reaching the udder of the ewe. The animal then lies down often, and perfectly motionless; if it is raised up, it sinks down again completely exhausted. Even during the first few days swellings are formed at different joints, which are soft, inflamed and very painful. The lamb walks very slowly with the affected leg, or cannot step on it at all. The size of the swellings varies. Sometimes they are as large as a walnut and sometimes smaller.

The disease generally lasts eight or twelve days, but death sometimes ensues during the first three or four days; in which case the debility reaches its highest point, and an offensive diarrhœa sets in. If recovery takes place, it is very slow and requires several weeks.

On dissecting the bodies, nearly the same morbid changes are found as in the atrophy of foals. The stomach and intestines are more or less inflamed, the swellings at the joints contain a large quantity of clear, bloody or pus-like synovial fluid, and the ligaments, more rarely the ends of the bones, are inflamed; sometimes yellowish, briny effusions are found in different places under the skin, and watery effusions in the cavities of the chest and belly, but the presence of these symptoms depends on the various forms of the disease.

The true nature of this palsy has not been definitely ascertained, but it seems to be caused by an inflammation of the intestines, coupled with an external rheumatism. The causes of the disease are numerous, but the greater part have not been sufficiently investigated. Lambs are undoubtedly born either with the developed disease or with a predisposition to it, and the cause must therefore be sought in the mother-ewe. Experience teaches that vitiated food has such injurious effects during pregnancy that the lamb is affected with palsy shortly after its birth. But it is not only vitiated food that may be held responsible, but

a sudden change of diet during and after parturition, especiably if too rich food is given after keeping the ewe on scanty diet. If the diet of the ewe during the last months of pregnancy consists of much clover, hay, potatoes, grain and drinks of groats, the lambs are very prone to palsy soon after birth. Mouldy food of all kinds, mouldy oil-cakes, rotten carrots, potatoes, etc., as well as putrid water, are very injurious.

The injurious influence of vitiated food in producing the palsy of lambs has not only been proved by numerous accidental observations, but is shown beyond a doubt by interesting and striking direct experiments. The fact that the milk of the mother exercises great influence in the production of the disease is proved by the experiment of allowing healthy lambs to suck the milk of a ewe whose young perished in this way. I have tried this experiment more than fifty times, and the lambs were always affected with the disease. The fact is therefore beyond a doubt.

Not only vitiated or improper food, however, causes the milk of the mother to become injurious, but also a diseased condition of the ewe, especially if she be affected with the fluke and rot. In lambs, catching cold is a source of palsy, which is the more certainly produced if the above-mentioned predisposition exists. It cannot, however, be stated with certainty whether catching cold is necessary, or whether the disease may be produced without, nor has it been ascertained if it can arise solely from catching cold without the presence of a predisposition for the disease or of other circumstances. Both are probable, however. It is most common during the wet, cold days of March and April and during bad weather, especially when the sheep are kept in warm, narrow and close stables. It appears particularly in weak, thin-wooled lambs whose development is retarded, probably because they are most sensitive to cold.

Palsy of lambs is not contagious. This has been proved by experiment, and has hardly ever been doubted. If it has appeared in a flock, all injurious influences which might continue to act must be immediately removed or avoided. This is very important, because the cure is very difficult. A proper diet for the ewes is indispensable, and should consist of good hay, straw, carrots, etc., in winter, while all vitiated food, rotten carrots or potatoes, and poor water must be avoided. Drinks of groats or oil-cake in water are also objectionable. In summer the animals should be led to the best possible pasture. The lambs should never be separated too long from the ewes, to prevent their becoming too hungry and overburdening their stomachs by too much suck when they are returned. They should receive suck at least every three or four hours. The stable must be free from draught and not too warm, the best temperature being from 45° to 55° Fahr. Not unfrequently these precautions prevent the spread of the disease and make it disappear entirely. This must take place if the causes are removed, and lambs already afflicted will frequently recover without further aid. All lambs which do not evacuate a liquid yellowish excrement a short time after birth, which may be recognized from the fact of its soiling the tail and the wool around the anus, are in danger of the disease, especially if cases of it have already occurred in the flock. Their constipation must be cured by giving them each a small teaspoonful of glauber salts in water, and repeating the dose if necessary until a thin excrement is discharged. This simple treatment is generally sufficient to prevent the disease, provided all directions about diet are followed. Lambs which suffer already from the disease are also made to swallow a laxative like the above. In mild cases this is sufficient, but it proves unavailing when the disease runs high. A very large number of remedies has been proposed,

but their enumeration here would be without practical benefit. I will therefore mention only those which are supported by good authority:

In the beginning of mild forms of the disease the following is a certain remedy: Five parts of powdered sulphate of antimony are mixed with one part of butter, and of this a piece of the size of a hazelnut is given three times a day to the patient. Tartar emetic one-twenty-fourth ounce, sal ammoniac one ounce and glauber salts two ounces, are dissolved in a quart of elder-flower tea, and a teaspoonful of this given four times a day. Clysters of oil, soap and water are also injected frequently, and an irritating embrocation applied externally. As much magnesia as can be taken up with the point of a knife, given in a little chamomile tea, is very serviceable, especially if a discharge of dung has already taken place. If the same quantity of powdered rhubarb is mixed with the magnesia, it renders the remedy still more effective.

If the disease is already advanced or malignant, medicines generally afford little relief. The following, however, is sometimes serviceable: Extract of nux vomica one-half ounce is dissolved in a quart of water, and of this a teaspoonful is given three times a day. If great debility is present, the following is made to alternate with the nux vomica: Camphor one-fourth ounce is rubbed up with the yolk of an egg and then mixed with chamomile tea, peppermint or calamus-root by shaking.

Various remedies have also been proposed to cure the stiffness and the swellings at different parts of the body. Several setons, consisting of a woolen string one inch in length, soaked in turpentine, are drawn under the skin of the affected leg, or the diseased parts may be moistened with oil of turpentine and ammonia. A sharp embrocation applied twice, or even the burning iron if nothing else

is at hand, is useful, It is not advisable to open the swellings of the joints, because a malignant suppuration and caries would generally result. In order to improve the condition of the whole body, cold baths at about 50° Fahr., to which are added very strong chamomile tea, a little salt and wood-ashes, are prescribed. The lamb must remain in the bath half an hour, and its body should be strongly rubbed. It is then dried, wrapped in a woolen blanket, and allowed to remain in this way for six hours in the warmest part of the stable. This treatment produces an increased action of the skin, which frequently brings about a cure. If the forces of the lamb, and with them its appetite and liveliness, return, a cure may be expected with certainty, and all that remains to be done is to see that the animal frequently receives suck and that it is kept warm. The stiffness, which often remains for weeks and months, gradually disappears, and the swelled and distorted joints regain their natural condition and flexibility.

MAGGOTS.

The disease called maggots is produced by a general unhealthy condition of lambs and one-year old sheep, in which a large number of small worms or maggots (the *Strongylus contortus*) are formed in the stomach. Its symptoms are very similar to those of the lung worms, with the exception that the respiration is unimpaired and no cough or wheezing is produced. Both diseases sometimes appear together. The disease may be recognized with certainty only after opening the dead body, when the whole system is found to be pale, flabby and lean. In the runnet-bag, and sometimes in the duodenum, the above-named worms

are found in greater or less quantities, enveloped in tough mucus. If one or more lambs have died of the disease, and show the same results on dissection, it may be concluded that the other sick lambs of the flock suffer from the same disease if they exhibit the same symptoms.

If the disease has not progressed too far, and the lambs retain a certain amount of vigor and appetite, a cure frequently succeeds. Half a teaspoonful of a mixture of purified hartshorn oil and turpentine, each half an ounce, and brandy four ounces, is given twice a day for several days in succession, and the remainder of the treatment is like that for lung worms.

THE LARVÆ OF THE GADFLY.

The gadfly, or *œstrus*, is found during the whole summer near the pasture-grounds of sheep, and annoys them, especially in hot weather and at noon. It has not been ascertained at what point of the sheep's body it deposits its eggs, but it is probably at the nose and lips. It is frequently observed that the animal, after a gadfly has left it, shakes its head violently, stamps with its feet, rubs its nose on the ground, runs about, sneezes, hangs down its head and looks terrified. When the sheep are seen to stand closely together in mid-day heat with their noses on the ground, it is probably for the purpose of preventing the œstrus from reaching their noses and lips.

As soon as the larvæ are hatched from the eggs, they crawl up through the nose to the sinus of the frontal or of the maxillary bone, into the cells of the ethmoid bone or into the cavities of the uvula. They attach themselves to the mucous membrane by means of their hooks, and live on

the pus-like secretions which are produced there. In ten months they reach their maturity, and drop out of the nose or are thrown out by frequent snorting and sneezing of the sheep. This occurs generally from March to August, and the larvæ then undergo further changes on the outside of the sheep's body. If large numbers of these larvæ are present in the cavities of the head, they produce in spring, when they are fully developed, various symptoms of disease, and even death. When the disease is of a mild character, the patients sneeze frequently, rub their heads against different objects, shake them violently, lift their noses high, and remain in this position for some time or turn aside, and there is a discharge of mucus from the nose. In a more violent form of the disease, the patient lets its head drop down to the ground, walks about as if intoxicated, turns around, becomes stupid and sad, and ceases to take food. These symptoms are often mistaken for vertigo. When the disease has reached its highest point, the animal loses flesh, falls down frequently, grinds its teeth, rolls its reddened eyes, and finally dies on the fourth or eighth day. In mild cases recovery takes place unaided: the larvæ are thrown out by frequent sneezing, along with mucus; and this is the only sure sign of the disease, at least for the non-professional. Sometimes vertigo is present at the same time.

If the head of a dead animal is opened, more or less larvæ are found in the above-mentioned cavities, which resemble those found in the stomach of horses. The mucus membrane of these cavities is inflamed, red, bluish, dark-red or ash-colored, and sometimes even gangrenous at different points. Thirty and even forty of these larvæ have been found together, but there is generally a much smaller number present.

To cure the malady, the larvæ must be removed. For this purpose a little snuff or sneeze-wort (*Veratrum sabadilla*),

lime, etc., is introduced into the nose several times a day, which occasions such violent sneezing that the larvæ are sometimes gradually thrown out. Twenty or thirty drops of animal oil may also be injected into the nose. In many cases these remedies are unsuccessful, especially when the symptoms are very violent. The remedies must then be introduced directly into the cavities or sinuses. For this purposes, the horns are sawed off close to the head, or an opening is made into the frontal and maxillary sinuses by means of a trochar, and the remedies introduced through these channels. The larvæ cannot bear the external air and die soon. They are then ejected by sneezing. The artificial openings heal in a short time unaided.

If many sheep suffer at the same time, it is very inconvenient to treat them separately. Hair, feathers, tar and horn-shavings are burnt in such cases in the stable, in order to produce sneezing. To prevent the adhesion of the larvæ and eggs, the nose and lips of the sheep should be covered with oil, fat, tar or hartshorn oil, especially at the time when the insects appear in great numbers. This applies particularly to lambs and one-year old sheep, which are most frequently attacked.

MADNESS.

It is a peculiar fact that madness is of much rarer occurrence in sheep than in cattle, notwithstanding that there are more flocks of sheep than herds of cattle, and that the shepherds' dogs are generally of the same race as those kept by keepers of cattle. The cause of this is difficult to explain. Perhaps sheep are not so susceptible to the virus or contagion as cattle, and the bite of the dog is more fre-

quently harmless because the thick wool keeps the saliva from the wound.

Since I had an opportunity, about twenty years ago, to observe five mad sheep, I am able to give a correct description of the symptoms. The disease began, as in all animals, by general listlessness and sadness, but the opposite soon took place. The animals were very wild and restless, and jumped constantly on other sheep; their look was wild and threatening, and they attacked all objects in their reach, even men and dogs. Their restlessness and excitement was very great. They ran about, stamped and bit the ground, butted their heads against it, and jumped about in a very peculiar way. Some of the sheep bleated occasionally, producing a piercing shriek. The appetite and rumination ceased even from the first, and a sort of palsy set in. One sheep, which had been sick for three days and was kept in the stable, was palsied so much that it could scarcely get up. Its eyes were opened widely and glittered with peculiar lustre. It bit at a stick which was held in its reach, and even at the iron prongs of a dung-fork, so violently that its mouth began to bleed. After I had opened the stable-door, it sprang up and made an attack on men. A dog that went barking up to the sheep could not intimidate it, although it was generally very easily frightened. It even attacked the dog and made it retreat. No fear of water could be discovered. All of the mad sheep died on the fourth and sixth days.

The appearance of madness after the bite is not limited to any definite time. It has been observed after eight days, but may not break out until after several months. In the above-mentioned case, five and six weeks respectively had elapsed. The post-mortem examination yielded uncertain and unimportant results. The dead bodies were buried deeply or burnt, and the stable well cleaned. Especially

must the dung be removed, and all objects brushed over with whitewash to which chloride of lime has been added.

TO TELL THE AGE OF SHEEP.

The age of sheep, like that of the other domestic animals, may be determined from the change and condition of the teeth. This is certain up to the sixth year inclusively, and tolerably sure after this age. The sheep, like the ox, has eight incisors, which are all situated in the lower jaw, as in all ruminating animals. The visible part of the teeth which projects above the gums is called the crown. At its lower end, the crown becomes thinner and is enveloped in the gum. This part is called the neck. The lower end of the tooth, which tapers to a point and is situated in the socket, is called the root. All the teeth are placed loosely in the sockets and admit of more or less motion. The two middle teeth are called the tongs or gatherers; the two on each side, the inner middle teeth; and the next on each side, the outer middle teeth. The two external ones are called the corner teeth.

In new-born lambs the two gatherers are just visible above the gums; after six or eight days, the two inner middle teeth, and after four or six days more the two outer middle, teeth, make their appearance. Six or eight days later the two corner teeth may be seen; so that in three weeks after birth the sheep has its full complement of incisors. These teeth, called milk-teeth, become longer and broader, and reach their full development at the end of the first year. Their upper edge, or edge of the crown, is somewhat pointed.

The milk-teeth remain from eighteen to twenty months,

and then fall out, and are replaced by permanent teeth in the same order in which they appeared. The permanent teeth differ from the milk-teeth by the fact that the upper edge is not pointed, but straight and dull. They are also stronger and broader than the milk-teeth, and no longer milk-white, but yellowish.

When the sheep is eighteen or twenty months old, the milk-teeth fall out and are replaced by two permanent teeth. The animal is then called two-toothed.

When the sheep is three and a half years old, the two outer middle teeth fall out and are replaced by two permanent teeth.

When the sheep is four and a half years old, the two corner teeth fall out and are replaced by two permanent teeth; and now all have changed. The animal is then called eight-toothed.

In the sixth year the permanent teeth have obtained their full development, and are long and broad. The upper edge appears smooth and sharp.

After the sixth year the incisors undergo different changes, from which the age of the sheep can be discovered with a tolerable degree of certainty. The edges of the crown gradually become nicked and dented, until they wear down almost to the root. This takes place in the some order as the changes of the teeth. In the seventh year both tongs or gatherers become notched at the edge of the crown, and in the eighth the nearest two become notched, although a more distant one may change instead, and the notches of the gatherers become deeper. In the ninth year the crowns of the gatherers and the inner middle teeth are indented very deeply, and the other teeth also begin to show notches. In the tenth and twelfth years the crowns of all incisors are broken and worn, so that nothing but the roots remain.

Under certain circumstances, produced by diseases, food, etc., the wearing out of the teeth sometimes varies considerably from the above order. Some sheep lose the crowns of their teeth in the sixth and seventh years, while others retain them unchanged until the eighth and tenth years or even longer. Vigor and health of body preserve the teeth.

CANCER OF THE TONGUE.

Cancer of the tongue is a species of gangrene or mortification of the spleen, which is contagious, and may be recognized by a blister on the tongue, which speedily changes to a cancerous ulcer. Symptoms of general sickness are not usually observed before the appearance of the local disease, but fever is sometimes present. The tongue, palate and gums are swollen, bright red and warmer than usual. The motion of the tongue is obstructed, and blisters of the size of a pea or hazel-nut, filled with serum, blood or pus, are found on it, which burst, discharge their contents and leave gangrenous wounds or continue to spread. The blisters are either few and large or many and small. The part of the tongue on which the ulcers are situated is insensible, cold and of a blue or black color. If the disease spread, the larynx and pharynx are also attacked. After the ulcers have developed, symptoms of fever appear, and if nothing is done to check the disease, death results after convulsions, distension of the belly, cold feet and cold sweats, in twelve to forty-eight hours. Recovery may be hoped for when a good treatment is adopted early to make the ulcers assume a mild form.

The disease frequently attacks horses and mules. In 1862, I treated more than thirty thousand horses and mules

in the United States Army of the Potomac, which suffered from the same disease, and not a single one fell a victim to it. This I can prove by the highest authorities, and I am therefore sufficiently acquainted with the disease to describe it and give an opinion concerning it.

A post-mortem examination exhibits the partial destruction of the tongue, besides the phenomena described under "Gangrene of the Spleen." The disease might be confounded with the mouth plague, but in the latter the blisters are scattered all over the mouth and leave no deep ulcer after opening. It is also generally in combination with the foot rot. Cancer of the tongue is of much shorter duration, and is much more fatal. The causes are the same as those of gangrene of the spleen.

The success of the treatment depends on its early commencement, before the blisters have opened and changed to ulcers. The blisters should be cut out of the tongue, if possible, without tearing them. They may be squeezed out with a strong tin spoon, and moistened with concentrated muriatic acid, or, better still, sulphuric acid, by means of a brush, after removing the contents with a sponge. Care should be taken that the matter does not come in contact with the operator. The food should be soft and tender. The patients should be separated from the healthy animals.

INTERNAL DISEASES.

INTERNAL DISEASES are those which are not situated in the organs on the surface of the body, which cannot be perceived by our senses (sight, feeling, etc.), and which are cured principally by medicines passing into the blood through the organs of digestion. Although we cannot see a diseased internal organ, we can discover an abnormal condition from the disturbance of its functions and of those of the whole system. The signs by which we can determine the nature, degree and duration of the disease are called its symptoms. They are the language of Nature, which shows its suffering and calls for help through them. If these signs are rightly interpreted, we will be able to judge the disease correctly and to select the proper remedies, but if the signs are misunderstood, a wrong conclusion is arrived at, and the consequences are unfavorable. Whenever an abnormal condition is discovered, there is a diseased action of some organ present, and in order to find the seat of the disturbance it is indispensable to know the functions of each separate organ in the healthy animal thoroughly. Breeders and owners of animals should therefore endeavor to become acquainted with them by careful observation of healthy animals.

If an animal is sick—and this is generally easily recognized—the next step is to discover from what disease it suffers; that is, what organ is affected. For this purpose the patient must be examined. The owner of cattle must

ask himself the following questions and answer them by a thorough examination of the sick animal and an observation of all the symptoms:

With regard to the surface of the body. Is the heat increased, diminished or unevenly distributed? Are the extremities warmer or colder? Are swellings found on the skin, and of what nature are they? Are ulcers present? Are the mucous membranes of the nose and mouth red, pale or yellowish, and are blisters or ulcers found on them? Are the eyes dull, deeply situated and without visible veins? Is the belly distended or flabby? Are the hoofs in their normal condition?

With regard to the circulation of the blood and the respiration. Is the breathing attended by groaning, whistling or other noises? Is there considerable motion of the ribs, flanks and belly, and does the animal breathe with distended nostrils? Is the exhaled air hot, cold or ill-smelling? Does the animal use its voice? Does it cough, and of what nature is the cough? Is it dry, moist, wheezing, etc., and is it most frequent in the morning?

With regard to the digestion, excretions and secretions. Is the appetite diminished, or has it disappeared entirely? Does the animal prefer one kind of food to another? Does it eat fast or slowly? Can it open its mouth properly, and does it retain the food in its mouth without chewing it? Can it swallow well, and does it drink much, hastily or slowly? Does a portion of the water run out again through the nose? Is there a frequent or a rare discharge of excrement, and is the latter compact, moist, dry, liquid, or in large or in small balls? What is its color? Does it contain undigested food, worms, matter, blood or mucus, and is it offensive? Is there a discharge from the nose, and what is its nature? Is it thick or thin, adhesive, yellow, creamy, greenish, or clear and watery? Does it smell?

Is the mouth dry or moist, hot or cold, and is it covered with froth? Does the animal perspire easily? Does it urinate frequently or seldom, much or little? Does it require exertion, and is it painful? Does the urine come gradually and in drops? Is it thick or thin, watery, clear, troubled or bloody?

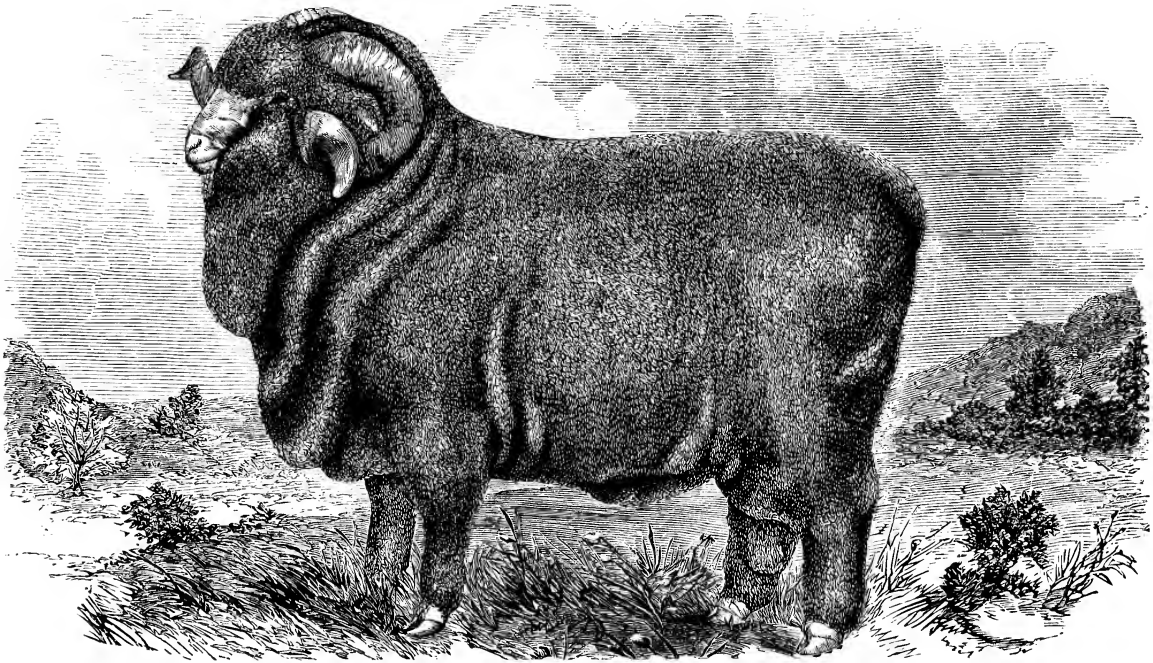
With regard to the senses. Is the animal sensitive to external impressions or dull? Are the eyes opened or closed, clear or dim, shining or dull, and is the animal insensible and stupid?

With regard to the organs of locomotion. Does the animal stand with curved back? Does it look at its belly in a restless manner, or is it quiet? Does it lie down and roll about? Are its motions lively or slow and lazy? Does it limp and totter? Is the neck movable or immovable, hard or stiff?

It must be further considered if one or more parts suffer at the same time.

Even if owners of cattle cannot recognize the disease from the group of symptoms, they will be able to give the veterinary practitioner valuable information concerning the commencement of the disease, and enable him to fix on a plan of treatment much sooner than without such information.

Another way of recognizing diseases is to dissect animals after death, and examine the different organs as to their texture, color, consistency, position, changes, etc. Such post-mortem examinations mostly enable one to determine the character of the disease with certainty if this could not be done during life, and to ascertain its seat and the reason of its fatal termination. It is necessary, however, in cases of errors, doubts and wrong conclusions, to consult practical veterinarians, possessing thorough anatomical knowledge, and not quacks who are destitute of it, as is too often the case.



INFANTADO RAM "GOLDEN FLEECE."

The Property of Col. E. S. Stowell, of Cornwall, Vermont.

CLASSIFICATION OF DISEASES.

Ever since the most remote ages it has been customary to divide the mass of diseases into classes for greater convenience, and I will here mention some of the most important for the better understanding of different terms.

With regard to duration, diseases are divided into—

Short, acute, which do not last longer than three or four weeks;

Exceedingly short, which do not last longer than three days, such as various forms of mortification of the spleen and colic;

Very short, which terminate on the seventh or tenth day; and

Slow, chronic, which last longer than forty days, and may continue for years, as rot of the lungs.

PLAGUES attack many animals—either of the same species, as sheep, or of different species, as horses and cattle, from the same causes. They are divided into—

General plagues, epidemics, or *epizoics,* which originate from external, general, unusual and transitive causes, and commit ravages among the different species in different localities at the same time.

Local plagues or *enzoics,* which occur only in certain localities, and arise from local causes, such as topographical situation, soil, pasture, stables, etc.; for example, "fluke."

Contagious and non-contagious plagues. The former include the pox of sheep, mortification of the spleen, cancer of the tongue, sore mouth, foot rot, scab, pneumonia and diarrhœa.

Non-contagious plagues are—rot, fluke, lung worms and maggots.

SINGLE or SPORADIC DISEASES are those which attack

only single individuals from special causes, as, for example, inflammation. Sporadic diseases may, however, sometimes assume the character of a plague, and *vice versâ*.

With regard to the mode of spreading into contagious and non-contagious disease.

Contagious diseases are those in which matter is formed and discharged, which may produce the same disease in other healthy animals if it is transferred to them. This matter is called "the virus of the disease."

If the virus is contained in certain bodies, such as saliva, blood, mucus, excrements, etc., it is called fixed (as in mortification of the spleen and madness), and acts either by being directly transferred to the body of a healthy animal (by licking, biting, etc), or by the healthy animals coming in contact with objects contaminated with it (such as harness, blankets, cribs, mangers, etc.).

If the virus separates as a vapor, as by the exhalations of the skin and the respiration, it is thus mixed with the air and breathed by other animals. Winds sometimes carry it to a considerable distance. It acts probably by being inhaled and by coming thus in contact with the blood. The fixed virus is mostly produced by chronic diseases not attended by fever, and the volatile by feverish diseases. In many, a fixed and a volatile virus are developed at the same time. Many kinds of virus act only on the species in which they are developed (as in the rinderpest and pleuropneumonia), while others may be transferred to other animals (such as madness and mortification of the spleen).

Some contagious diseases attack an animal but once, as the sheep pox, rinderpest, etc., and the animal is then no longer susceptible for their virus.

Non-contagious diseases are those in which no virus is formed. They comprise by far the most numerous class;

for example, inflammation of the lungs, vertigo, inflammation of the brain, etc.

The healing process is an action of the system by which the disease is decomposed, and health is made to return either by nature alone or with the aid of art. The great power to heal lies in the organism of the animal itself, and it is in our power only to modify the efforts of nature. This object may often be accomplished by a negative method, as by removing certain irritations, changing the diet, etc. An active interference is sometimes unnecessary, because nature itself often possesses the power to restore the health. Premature interference is productive of more injury than benefit, and there is no doubt that nature is able to heal many diseases in man and other animals.

To restore health the following requirements must be fulfilled: 1. The cause of the disease must be removed if possible; 2. The product of the disease must be got rid of; 3. The affected organ must be renovated; and, 4. What has been lost must be replaced by rest and proper food.

The fulfillment of these requirements belongs principally to art, since nature does not always or quickly enough succeed in removing the cause of the disease (foreign bodies and external irritating influences), in preventing its progress, and in avoiding dangerous influences.

DISEASES OF CATTLE.

To make this work more complete, I will add a dissertation on the DISEASES OF CATTLE, dwelling more especially on epidemic diseases and their treatment, as far as may be serviceable to the farmer or cattle-owner who has not studied the art of curing them. As a matter of course, a certain degree of intelligence and interest in the subject must be present. I have avoided all expressions which produce an ornamental style at the expense of clearness, and all technicalities which are not generally understood by the non-professional. My endeavor has been to write in a clear and popular style, and with all the brevity consistent with thoroughness and the demands of the practical farmer.

Since the pleuro-pneumonia (rinderpest) and the spleen disease have at the present time made their appearance in different States of the Union, I think it my duty to make public the experience which I may have acquired in treating them. The importance of diffusing knowledge on this subject is the more apparent from the fact that the diseases in question undermine the wealth of whole countries, and this has been recognized by the different governments, who have given especial attention to the subject. I hope the public will favor me with their confidence, as I have proved that I am fully acquainted with the symptoms, the origin and the course of the diseases. In 1866 I entered into a contract with the British Minister, Sir Frederick Bruce, to

cure seventy-five per cent. of the sick cattle in England, Scotland, Ireland and Wales, and succeeded in curing a greater proportion than the contract called for.

The assertion made by ignorant persons that the malady was "Spanish disease" is erroneous, since Spain was comparatively the least afflicted with the epidemic, and Spanish cattle were preferred to those of Holland, East Friesland, Oldenburg and Holstein during my residence in England. It has also been asserted that the disease was the pox, and killing was recommended, because no cure was possible for that disease. My experience in thousands of cases where a perfect cure was effected enables me to contradict this. To prove my assertion, I will offer to cure ninety per cent. of animals affected with the epidemic. The epidemic has also been frequently mistaken for spleen disease. The latter broke out among the United States cattle droves after the surrender of Richmond, and I succeeded in curing more than five thousand head in Alexandria during the months of July and August.

In Europe, more particularly in Prussia and Russia, the districts where epidemics appear are, as it is termed, enclosed by a cordon; that is, no cattle or food, such as hay, straw, etc., are allowed to pass over the boundary of the infected district until the superintending veterinary surgeon declares that no new cases have occurred for ninety days. An inspection by an experienced veterinarian who is thoroughly conversant with the disease would be very desirable, in order to prevent the spread of the epidemic to other States.

THE CATTLE POX.

The cattle or cow pox belongs to the rarer and less important diseases, and it easily disappears again spontane-

ously. It is not necessary therefore to consider it from an economical point of view, and its description here would be entirely superfluous were it not for the highly important and interesting relation which it bears to small pox in the human being.

The pox consists of a peculiar eruption on the udder of cows. It rarely appears on bulls or oxen, perhaps only after contagion. The eruption generally takes place on the teats of the udder, but is also found on other parts of it in exceptional cases. It appears in the following manner: One or more red spots form on the udder, having the appearance of flea-bites. In their centre a red, hard knot appears, which is very small at first. In a few days this knot increases in size, projects more above the surface of the skin, and the latter becomes less red. From the eighth to the tenth day the pox has attained its maximum size, and has then a whitish, yellowish, bluish or silvery appearance. The red circle around it has then disappeared, and it has an oval or circular shape of the size of a half dime. It projects above the skin, and is somewhat depressed in the centre. It is tolerably hard, has a cellular, spongy structure like a lemon, and contains a clear, watery, colorless and odorless liquid or lymph, which oozes out in small quantity when an incision is made into the pox. Ten or twelve days after the appearance of the disease, the lymph becomes troubled and changes to pus or matter; the tumor dries up, and a hard scab is formed, while the size of the eruption diminishes. The scab begins to form in the centre, and gradually spreads to the circumference. It is at first clear and yellow, but soon becomes brown, and finally dark-brown and nearly black. From the twenty-first to the twenty-eighth day, sometimes a little sooner and sometimes a little later, it drops off and leaves a permanent scar, which is reddish at first and afterward recovers the natural

color of the udder. True cow pox always shows these phenomena, but awkward milking, incorrect treatment and many other circumstances often conspire to change its appearance and defer the cure. The number of the spots, as well as their size, varies. In some cases only a few, and in others thirty, forty or even more appear. Sometimes they become no larger than a pea, while at others they reach the size of a dime. Frequently eruptions of different sizes are found on the same animal, but they rarely appear simultaneously. Their appearance is generally gradual, and the last may not be developed until one or two weeks after the first. For this reason the udder may be covered with eruptions in all the different stages of their development. In many cases, especially if many and large tumors are present, the udder is more or less sensitive and swollen, which may be caused by the fact that the cow cannot be milked at all, or only partially. No other symptoms of disease except the local ones are perceived, and the animal appears to be perfectly healthy. Rarely a fever makes its appearance, and then the cow eats little or not at all, does not chew the cud, and yields less and thinner milk than usual. These symptoms are present only from a few days before the eruption appears to its complete development, and they always disappear when the tumors dry up. The cow pox is most frequent in the middle period of life and in the first few months after calving; but it has been observed on cows two years old, which had never calved, and in old cows that ceased to give milk. The disease appears in all countries, and topographical position or climate seems to exercise no perceptible influence. The disease is of more frequent occurrence in summer than in winter. Everything tending to produce a rush of blood to the udder, the change from poor and scanty to copious and nutritious food, and the more plentiful secretion of milk after calving, facilitate its development.

We are wholly in the dark concerning the cause of cow pox. It arises spontaneously and attacks but once. In many cases it is imparted by contagion, as when a person milks a healthy cow after one affected with the pox. It never appears as an epidemic, but is sometimes produced by contagion from the malanders (grease) in horses.

The cow pox is not only a very harmless, but a very insignificant disease. The accompanying slight fever and loss of appetite require no treatment, because they are of no consequence and disappear after a few days, when all the organs of the body again resume their natural functions. Nothing can be done to the udder, because the eruption can be neither accelerated nor retarded. It is therefore best not to interfere. All that can be done is to avoid rough handling and irritating external influences. The udder must be milked frequently (if this can be done without irritating the teats too much), very gently and with oiled hands. If this cannot be done on account of the number of tumors, and if the udder is very much swollen and inflamed, the animal should receive very scanty green food, and should be purged with half a pound or a pound of glauber salts. It is well to keep the patient warm and covered with a blanket. As soon as the tumors begin to dry up and change to scab, the fever disappears and the appetite and rumination (chewing the cud) return. Nothing can then be done but to cover the scabs with oil or cream.

If from improper treatment or other causes the tumors have passed into ulcers secreting an offensive liquid, and refuse to heal or cicatrize, an external treatment is necessary. The part should be washed several times a day with a solution of one ounce of alum or chloride of lime in a quart of cold water, or with a decoction of two ounces of oak or willow bark in a quart of water. If the udder is

inflamed and full of milk, the diet should be scanty, and the cow should be frequently milked with care.

We have seen that the cow pox is not only of no importance in an economical point of view, since it involves no pecuniary loss, but it is of incalculable benefit to the human race. Millions of the present generation are indebted to it for their lives, and for the fact that their faces are not disfigured by the small pox. Doctor Edward Jenner, an English physician, in 1775, made the invaluable discovery that persons who had an eruption on their hands, caused accidentally by milking cows affected with the pox, did not get the small pox. This led him to try several experiments. He innoculated the virus or poison of the small pox into persons who had had the cow pox, and failed in producing the disease. This led him to suppose that such persons were no longer susceptible to small pox, and his supposition was strikingly confirmed. He selected several persons and vaccinated them with the lymph of the cow pox, and the cow pox was in all cases developed in them without the appearance of other symptoms of disease. He afterward vaccinated the same persons with the lymph of small pox and without effect. These persons were not infected by touching small pox patients.

It has therefore been demonstrated that the susceptibility for small pox is destroyed by vaccinating with the matter of the cow pox, which is a sure and perfectly harmless remedy for that terrible disease.

The lymph of cow pox is called vaccine-matter (from *vacca*, a cow), and its innoculation, vaccination.

The discovery of Dr. Jenner naturally created the greatest sensation in the civilized world, and all governments took speedy measures to enjoy its advantages. At first it met with considerable opposition, prejudice and so-called religious scruples. But the force of truth conquered, and

it was soon acknowledged that vaccination was entirely without danger and one of the greatest blessings.

Before its discovery one-seventh—or, according to some, one-fifth—of the small pox patients died, and this large proportion does not include those that lost the sense of sight or of hearing or that escaped with disfigured faces. Since the discovery of vaccination, which is now prescribed by law in all well-governed countries, cases of small pox are rarities, and deaths from it hardly ever occur. Among thousands of young faces scarcely one is seen disfigured by small pox.

The lustre of the discovery has, however, of late been somewhat dimmed, because it has been observed that years after vaccination the small pox nevertheless broke out, and with disastrous consequences. This observation has given rise to the supposition that the vaccine-matter deteriorated by being propagated from arm to arm and by being removed too far from its original source. For this reason endeavors are made to secure a fresh supply direct from the cow. Every owner of cattle would secure the thanks of the medical authorities by giving them immediate notice of the appearance of the cow pox.

Besides the above cow pox, other eruptions, which may be easily confounded with it, sometimes appear on the udders of cows, but they are without danger, and disappear again spontaneously.

SPLEEN DISEASE.

As spleen disease is so frequently confounded with pleuro-pneumonia, even by practitioners, I find it necessary to make public a description of the disease. It attacks all domestic animals, even poultry, is highly dangerous, and

kills the majority of the patients so quickly as to leave no time for remedies. Cattle, pigs, sheep, and more rarely horses, are most liable to its attacks. It is most frequent in warm climates and in summer. The disease was known in ancient times, and we find an account in Homer's "Iliad" of its ravages among the cattle herds of the Greeks.

The disease is of exceeding short duration, and fatal in the majority of cases, unless the speedy assistance of a veterinarian, who is thoroughly conversant with the disease, is procured.

Spleen disease in cattle. As has been remarked, cattle are the most frequent sufferers by spleen disease, which occurs in the following forms:

1. *Spleen fever*, which is of tolerably frequent occurrence and short duration. A perfectly healthy animal is suddenly attacked while working or eating, and even while its mouth is yet full of food. It drops down as if struck by lightning, and dies after a few minutes in convulsions. Sometimes the fit lasts several or even twelve to sixteen hours. The animal then becomes languid and weak, ceases to take food, staggers about, appears benumbed or wild and irritated, bellows with pain, and runs madly about. A frothy mucus, frequently mixed with blood, runs out of the mouth and nostrils, the eyes are reddened, filled with tears and project out of the orbits. Convulsions then appear, and finally death ensues. Immediately after death, black, tar-like blood runs out of the nostrils, the mouth and anus; the vagina opens and shows a dark-red or bluish color, and the body very soon passes into putrefaction.

The fever is not always, however, of such short duration. Sometimes eighteen to thirty-six hours elapse before death ensues. In such cases the disease commences with trembling and convulsive twitchings at different points of the skin. The animal stands off from the manger, or follows

the herd slowly and hesitatingly if in the field, becomes stupid and lazy, lets its head droop, puts down its feet irregularly, and pays little attention to surrounding objects. The appetite and the ruminating disappear immediately, cows cease to give milk and the thirst diminishes or disappears entirely. The animal is fearful, has a wild look; the surface of the body, the ears, the horns and the mouth becomes alternately hot and cold; the eyes, which at first were red and fiery, become dull; blood frequently runs out of the nose and anus; the mouth is filled with saliva; the respiration is labored, forcible and snorting; the patient gnashes its teeth; the pulse beats seventy to a hundred times a minute, and the beating of the heart is loud and can be felt. Finally, the surface of the body becomes cool, and the animal dies in convulsions. I have seen cases in my practice where death ensued only after the fifth day, but these are exceptions, and can only be accounted for by a very strong constitution of the animal.

2. *Spleen carbuncle.* In many, and perhaps in the majority of cases, boils or carbuncles break out on different parts of the body, especially on the head, neck, shoulders, flanks, buttocks or thighs, either at the appearance or during the course of the fever. These boils are developed very quickly in larger or smaller numbers, are at first hot, grow in height and breadth with great rapidity, and then become mostly cool and insensible. On cutting into them, a yellowish, briny, jelly-like mass is found under the skin. The development of carbuncles has often been considered as a natural and healthy diversion or turning aside of the disease; but it has been ascertained that they increase the danger if they appear on the head or neck, and obstruct the respiration or render it impossible. They may also become fatal by passing into gangrenous ulcers. If they suddenly disappear, however, it is generally a sign of death,

because internal parts, especially the lungs, are then attacked.

3. In some cases of spleen fever, thick, tar-like blood collects in the rectum. These symptoms have been erroneously taken for a different disease, but they are only accidental attendants of spleen disease. Since spleen disease is highly dangerous, and most animals attacked die, it is very important to avoid confounding it with other diseases. If in a short time several head of cattle perish suddenly, especially in summer, without the previous appearance of other diseases, spleen disease may always be suspected. Such cases are most easily mistaken for wind colic, but this is caused by overfeeding, particularly with clover.

If spleen disease has broken out in a herd, the healthy animals must be separated from the sick, and the latter put in a spacious, cool, shady and well-ventilated place. The air should continually renew itself, while dampness combined with heat, as well as the action of the hot rays of the sun and putrid swamp and stable air, should be very carefully avoided.

The best remedy, which I used in my own practice, was pouring moderately cold water from some distance above over the patient until violent trembling ensues. Internally, half an ounce of sulphuric acid in half a pint of water is given. Chloride of lime, half an ounce, given every half hour with flour and water, is still better. Its use is continued until an improvement is visible. An embrocation of warm vinegar is also recommended. If carbuncles are present, they are opened, cleaned out by directing a stream of water or a solution of zinc vitriol into them, and are then covered with butter of antimony by means of a small brush. The greatest care is necessary, and it is better to have the operation performed by a veterinary surgeon. If costiveness is present, a solution of two ounces of saltpetre

and twelve ounces of glauber salts is poured down the animal's throat, and clysters of salt, soap and warm water administered. A fontanel of thirty grains of white sneezewort is also applied. If an improvement is seen in twenty-four to thirty hours, the following powder is given twice a day in bran food: Gentian two ounces, saltpetre one ounce, calamus-root one-half ounce, and golden sulphur of antimony eight drachms.

The consumption of meat of animals belonging to herds where the disease has broken out is highly dangerous to man. It is true that it has sometimes from ignorance or brutal disregard of danger been eaten with impunity, but there are numerous examples where such meat, or even its broth, has produced the death of whole families or caused very dangerous symptoms. The milk of the sick cows also possesses highly injurious qualities. All persons who are engaged in treating or attending to the sick animals must be very careful not to come in contact with their blood or other humors. Those having sore or wounded hands should not be allowed to go near the patients. While applying clysters and fontanels or giving internal remedies, the hands should be protected by a coating of oil or by gloves. Immediately after the manipulations the skin of the operator must be washed with soapsuds or a solution of chloride of lime wherever it has been soiled. The disease is very easily imparted by contagion. Fatal results have been produced where a drop of blood of the animal spirted into the eye of the operator, or where a fly, after sucking the blood of a patient, alighted on the face of a person and pierced his skin.

Remark.—The spleen disease caused by contagion in the human being (and not by eating the meat of diseased cattle) is called the black pox. Shortly after contagion the part begins to itch and burn, and a blister is soon formed, which

contains a thin liquid. The spot then becomes in succession red, brown, and finally of a dark-violet color. It is very hard and forms a knot. A few days afterward a general swelling appears, and symptoms of disease begin to show themselves. The patient becomes sad, has the headache, nausea and fever. Chills alternate with burning heat, and the patient suffers great thirst. The tongue is dry and painful, the patient speaks incoherently, faints, and finally dies under the most excruciating sufferings.

I myself observed two such cases—the first on the lands of Count Dolgrow in the Russian Steppes, in 1846, and the second in 1849, on the lands of Count Pourtales in Prussia, near Berlin. In both death ensued, although the most celebrated doctors (especially in the second case) made strenuous endeavors to master the disease.

A sense of duty therefore leads me to draw the attention of the government to the prevention of this terrible disease, especially in this country, where veterinary surgery is yet in its infancy, and a veterinarian occupies but an humble position in the eyes of the masses. If therefore there is any suspicion of contagion, an experienced doctor should at once be summoned.

PLEURO-PNEUMONIA, CATTLE EPIDEMIC OR RINDERPEST.

This disease appears in two different forms, viz.: Acute, and slow or lingering.

The first symptoms of pleuro-pneumonia appear in the following form:

In the beginning of the disease the animals are in a state of languor and dreariness, keeping their fore legs wide

apart, so that the shoulder-blades and elbows protrude outward from the breast, the head hanging downward; the eyes appear dull and in tears; the hair bristly; the respiration is short and uneasy, with a heavy movement of the flanks and nostrils. From time to time a dull, painful and oppressed cough is observable, especially in the morning, when the animal is drinking or leaving the stable. The appetite for food is in many cases still unabated, although there is a remarkable disappearance of rumination; milking cows produce less milk, and it is thin and coagulates very soon.

During the progress of the disease the cough increases, becoming shorter, more dry and weak; the appetite and rumination disappear, and the yield of milk very soon ceases entirely. The sick animal stands with head and throat erect, the respiration is difficult, with a visible movement of the ribs and flanks, and the nostrils burst wide open. A thick slime flows from the eyes and nose, the animal drinks very little, and in short movements interrupted by coughs; is falling away, diarrhœa appears, and during the last days the animal in most cases lies down, not to rise again, and dies.

A great deal is said at the present time of this disease, which has made its appearance in almost every State in the Union, and the great losses caused from this horrible plague are enough to discourage all our large cattle-owners and dealers at such a dark hour of our country. It is therefore advisable to act in our own interest, and to look for a remedy against this horrible disease, which not only proves fatal to separate States, but sometimes to whole countries. The great importance of the subject, as well as the great danger threatened to cattle, generally causes the governments of these countries to pay particular attention to the treatment and abatement of the disease. Opin-

ions in regard to the origin of this disease are divided, but it is certain that it is contagious, for the following reasons: Pleuro-pneumonia may arise from itself, or may be transferred by contagion to healthy animals. The latter is often the case. The spontaneous formation of pleuro-pneumonia emanates from very different causes—

1. From the unfavorable influence of the atmosphere, especially during the spring, mostly in changeable, cold and damp weather, when the animals take cold.

2. By permanent feeding with artificial food.

3. By spoiled food, such as sour, mouldy, musty hay, rotten roots or bulbs.

4. By drinking unclean water.

5. By keeping them without exercise or motion, especially in overcrowded stables.

6. By careless attendance to the animal, want of cleaning the stables, etc.

7. By importation of untanned hides, etc.

8. By cattle imported from other countries, particularly in times of war, etc.

9. From low-situated pastures with marshy bottoms.

At the dissection of the animals we find in the carcass the most remarkable changes in the cavity of the breast. On cutting the breast, in most cases a large quantity of yellow water bursts forth, in which more or less yellow flakes or lardaceous articles are swimming. The lungs are covered with the same thick and lardaceous films, and adhere on one or both sides to the ribs, but always more to the right than to the left side. The lungs are partially or entirely callous, greatly distended and heavy, so that they weigh twenty to forty pounds and even more, whereas a sound lung only weighs from four to five pounds. On cutting the hardened part of the lungs it looks like marble, the dark, red-colored mass of the lung being interwoven by

yellow lardaceous veins diverging in every direction. The same thick films cover the surface of the lungs. This disease may sometimes linger from *two* to *three* months in the body before these symptoms appear.

The cure of this disease has to be undertaken in time, and with great care to prevent the largest part of the herd from perishing. I am prepared to save ninety out of a hundred in all cases. Pleuro-pneumonia is doubtless a contagious inflammation of the lungs, the breast and pneumonic membrane, with exudation of coagulable lymph into the textures and bronchials.

Symptoms of the Acute "Lungenseuche"—Cattle Epidemic.

This disease appears rather suddenly. The affected animal heretofore lively, grows remarkably weak and sullen; the walk is heavy and staggering, the hair bristly and without gloss; the ears hanging downward, and the head also. The muscles of the throat often show a convulsive, trembling movement, the hair at the same time rising in different places. This cutaneous convulsion sometimes develops into a general shudder and fatal convulsions. The ears and horns change from warm to cold, the inside of the mouth being always very hot. The eyes are reddened, in tears; slime flows from the mouth and nose; the respiration becomes difficult, and from time to time a short, weak cough can be observed. The fever now appears and rumination ceases. In the beginning there is a violent thirst and no appetite for food. The excrements of the animal are hard and gangrenous, and during the second day diarrhœa intervenes, the matter in the beginning consisting of a bad-smelling, dark or black-brown fluid, or a white, bilious slime. After a longer duration of the diarrhœa, the rectum and vagina stand open, the milk ceases, and the udder shrinks together, the animal often gnashing its teeth.

During the progress of the disease the animal is unable to stand, and at last even unable to rise, death generally taking place on the third or seventh day after the attack. The owner should resort to the proper remedies, even if the animal seems to be healthy, for if this disease once makes its appearance in a certain neighborhood, it generally spreads among all the cattle.

Dissection.—On opening the carcass, the tripe is hard and grated, containing in its interior and between its leaves a quantity of very dry food, which can easily be reduced to powder. The epidermis of these leaves can easily be peeled off, is black and dry, and appears as if burnt; the third stomach of ruminants and the intestines are inflamed and often gangrenous; the milk is parched up; the liver tawny and friable; the gall-bladder very large, containing a large amount of thin gall; the lungs are less inflamed than in lingering diseases, and the other parts of the body seem to be healthy, although the meat appears a little soft and discolored.

This disastrous disease has at different times destroyed the cattle of whole districts and countries, and thereby ruined the prosperity of their inhabitants. The country where this disease originated is Southern Russia, especially Bessarabia, Podolia, Keiv, the Ukraine and the dominions of the Cossacks of the Don. In 1717, for instance, 70,000 cattle died in the territory of Piedmont, 300,000 in Holland, and 26,000 in the Ecclesiastical States. In Denmark, 280,000 cattle were destroyed from 1745 to 1749, and in 1776 Holland again lost about 300,000 cattle.

The disease has been known in Germany since 1830 under the name of "Lungenfœule" (rottenness of the lungs), pulmonary consumption or pursiness. The first appearance was in Bohemia during 1831, 1841 and 1842; in Bavaria and Palatinate during 1844; in the southern part of Rus-

sia, especially in Bessarabia and Podolia, during 1846; in several provinces of Prussia during 1847; in Holland, Belgium, Eastern Friesland and Oldenburg in 1850 and 1851; also in Saxony, Hanover, Brunswick (especially in the Saxony provinces of Magdeburg and Merseburg), in 1866: England, Scotland and Ireland lost over 200,000; here it was known under the name of "Lungenseuche" (cattle plague or pulmonic plague). It was declared to be a contagious disease only with horned cattle, young and old, fat and lean, and not dangerous to men; even the meat was held to be eatable during the beginning of the disease.

THE END.

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THE DISEASES OF SHEEP

WITH AN ESSAY ON CATTLE PATHOLOGY

BY

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